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GUIDANCE ASPECTS OF
CO-OPERATIVE EDUCATION

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Chapter IAN HISTORICAL SKETCH OF THE CO-
OPERATIVE PLANINTRO-
DUCTION:

In the United States the first quarter of the twentieth century saw many advances in the field of education. Impelled to an awareness of new needs by the increasing numbers of students who demanded educational opportunities, institutions of learning every where were under the very practical necessity of devising programs and techniques that would enable them more adequately to cope with modern conditions. It was not merely a problem of expanding existing curricula to wider limits for it became evident that the traditional offerings were unsuitable for large groups of young people who were, nevertheless, soundly equipped to profit by further study. Therefore, a diversification of educational opportunities on the secondary level was attempted in an effort to accommodate

more effectively the greatly enlarged student bodies of our high schools. So successful was this departure from practices then current in the secondary field, that institutions of higher learning began to investigate the possibilities of offering programs more diversified in character and better calculated to serve the greatly augmented enrollments in colleges and universities.

The sociologist, Walter Robinson Smith, writing in 1928 of this trend, comments upon it as follows:

1"The essential feature in adapting higher education to democratic needs is differentiation. As rapidly as we learn to discover all types of ability, indeed as part of the process of discovering special abilities, the educational program must be varied to meet individual and group requirements. Already the former unified high school curriculum has been split up into a series of courses which permits reasonable specialization. But as the student advances more intense specialization is essential; hence the worship of a four year college course, with its requisite coddling of students, must give way to rather revolutionary

differentiations.....Individual differences guarantee that all cannot and will not take the same amount of training, but before we can grow up to the full stature of educational democracy our curricula must be so varied, from the primary schools to the university graduate and higher vocational schools, that every youth will have access to the full amount and to the kind of intellectual nutriment that he can assimilate."

GENESIS OF
THE
CO-OPERATIVE
PLAN

Among the schemes born in this period of intense educational activity was the so-called co-operative plan. The system was originated by Dean Herman Schneider who, in 1906, founded the pioneer co-operative school in the United States at the University of Cincinnati. As it was conceived by Dean Schneider, the co-operative idea represented a distinctly new educational technique, notwithstanding the fact that previous schemes, notably the "sandwich" plan, had provided for a division of students' time between scholastic training and industrial experience. However, the "sandwich" plan seems to be primarily an economic expedient designed to:

2"enable indentured apprentices to attend college half of the year, something quite unlike the co-operative plan by which the college provides its students with collateral experience."

Practiced more or less extensively in Scotland during the last quarter of the nineteenth century, the "sandwich" system was later adopted by several substantial British institutions where it is still in use.

DISTINCTIVE CHARACTERISTICS

The co-operative plan, on the other hand, embodies a sequential arrangement of periods of formal education and of industrial experience, carefully co-ordinated, and correlated one with the other. The administrative mechanism whereby students are paired in order that one may be at work while the other is at college is not of primary importance insofar as the philosophy of co-operative education is concerned. For this reason it is worthwhile to distinguish between schemes that are truly co-operative and those that belong more properly in other classifications. In addition to the "sandwich" plan already mentioned, various

apprentice systems, manual training schools, continuation programs, adult education projects, and kindred educational ventures are sometimes confused with co-operative education because of the fact that they are in some way related to commerce or industry. As Professor Park has very ably pointed out:

3 "in fairness to other methods and philosophies of education as well as to the co-operative system, the several methods should be sharply differentiated. In the study of a system, not isolated features, but a collection of attributes, and the object and method of their combination, should be considered..... Each (system) should be judged according to its own theory, standards, methods, and results; and its place in the general scheme of education should be determined accordingly."

There are two outstanding features of the co-operative plan that distinguish it from what may be called part-time or intermittent education. In the first place, as the name implies, the co-operative plan requires a reciprocal relationship between the educational institution and the business organizations with

which it is associated. This does not necessarily assume a written or formal agreement of a fixed, inflexible nature; it does necessitate a mutual understanding of the purposes of co-operative employment and of the methods to be used in accomplishing certain definite objectives.

Secondly, the co-operative plan involves various media for the co-ordination of the theoretical work which the student gets in school with the actual practice which he acquires on his working assignments. Among these integrating agencies are classes in co-ordination, co-operative work reports, supervisory visits, personal counselling and other things, all of which will be discussed in detail in a later chapter.

GROWTH OF THE CO-OPERATIVE IDEA

Now it would be misleading to give the impression that the co-operative idea, once initiated, grew and flourished of its own inherent vigor. Dean Schneider not only conceived the scheme but also nurtured it through its early vicissitudes in the experimental period. Critics of the plan were numerous; many there were who raised their

voices to say that the scheme would not and could not work. Nevertheless the co-operative enrollment grew, industrialists became interested in the idea, and the plan began to gain in favor among educators. Such was the success of the Cincinnati plan that other institutions adopted the co-operative principle. The year 1909 saw the establishment of the co-operative plan at Northeastern University in Boston, and 1910 marked a similar experiment at the University of Pittsburgh. The University of Georgia followed in 1912, Akron University in 1914, and the University of Detroit in 1915. Since 1919 the number of institutions wholly or partly committed to the co-operative principle has rapidly increased. There are at the present time some thirty colleges and universities in various sections of the United States offering co-operative courses. Among these, engineering curricula predominate, probably because of the relative ease with which engineering practice can be co-ordinated with technical courses. Nevertheless, the co-operative principle has been applied effectively to other fields of higher education.

LIBERAL
ARTS:

Antioch College at Yellow Springs, Ohio, under the leadership of Dr. Arthur E. Morgan, in 1921 re-organized its program and adopted a modification of the co-operative plan. In the ten years that have since intervened the college has demonstrated the practicability of a liberal arts curriculum operated on the co-operative basis. The 1930-1931 catalogue of Antioch College carries the following statement of purpose:

4"The Extramural School, which has been developed from the Department of Personnel Administration, conducts off-campus educational activities under the 'co-operative plan'. The co-operative plan provides that students shall alternate periods of classroom study with periods of work. Since the Engineering School of the University of Cincinnati began to operate on the co-operative plan in 1906, many institutions have adopted that method in schools of engineering and commerce. Antioch differs from nearly all of these in treating the part-time work primarily as part of a liberal education, rather than as an

apprenticeship in a calling, and also in making it apply to any field in which a student may wish to prepare."

BUSINESS:

A number of institutions, including Cincinnati, Northeastern, and New York University, have adapted the co-operative idea to curricula in business administration and commerce.

MEDICINE:

The College of Medical Evangelists, Loma Linda, California, inaugurated a co-operative curriculum in medicine in the fall of 1924, which has proved very successful.

5"The students' practical medical work is done in numerous hospitals, sanitariums, laboratories, and physicians' offices in Los Angeles and Southern California.... The types of work which the medical students do are such as pertain to the care and examination of patients - such work as is usually done by nurses, orderlies, laboratory technicians, internes, or even physicians."

THEOLOGY:

Even the field of theology has its co-operative school. The Lane Theological Seminary⁶ of Cincinnati operates a program of co-operative training for young men who are preparing for the ministry. Practical experience arranged for the prospective theologues

includes industrial and commercial contacts as well as later opportunities for acquiring an understanding of professional duties. Apparently the scheme has been welcomed by the students and has been advantageous to them.

But further elaboration upon the diversities of co-operative education is unnecessary. Enough has been said at least to indicate the fact that the co-operative principle is both flexible and sound. Since its inception, twenty-five years ago, the plan has ramified into many educational fields, grown in scope and in usefulness, and won substantial recognition as a valuable educational technique. A quantitative measure of the growth of co-operative enrollments in engineering schools is given by Dean F. E. Ayer in the Journal of Engineering Education for November, 1930, as follows:

"The total enrollment of co-operative engineering students in 1925 was 5550 students enrolled in sixteen schools. In 1930 we find nineteen engineering schools using the co-operative method with a total enrollment of 9550, or an increase of 70.8 per cent in students and 18.6 per cent in number of schools. The 5550

co-operative engineering students in 1925 was 10 per cent of the total number of engineering students enrolled in this country. In 1930, the 9550 co-operative students are 13.5 per cent of the total number of engineering students enrolled or an increase of 3.5 per cent."

FLEXIBILITY
OF
CO-OPERATIVE
EDUCATION:

Coincident with the substantial increase in the number of institutions offering co-operative courses and with the corresponding growth in such enrollments, distinct variations have developed within the co-operative plan itself. These differences, not merely matters of administrative detail, involve basic aims and purposes so that every co-operative institution is under the necessity of defining its own methods and ends.

7"There is no standard co-operative plan of education. A co-operative program takes on the ideals, purposes, and standards of the school and companies co-operating," writes Professor Timbie.

This is generally considered to be a strength of the co-operative plan, enabling it to fill effectively the varied needs of different communities. It has been well argued

8"that every school must be indigenous to the source from which it comes. Transplantation of educational institutions or methods is seldom successfully made without extensive modifications of the original plan. The sound procedure in educational reform is to allow native institutions and practices to evolve by giving support to enlightened minorities already informed about local needs, eager for action and aware of progressive tendencies in other places."

THE
CO-OPERATIVE
PLAN AT
NORTHEASTERN:

Those co-operative plans that have been most successful have been developed in accord with this thesis; those that have failed⁹ have disregarded it. The co-operative plan at Northeastern University is the realization of an ideal carefully worked out and persistently followed for over twenty years. Its primary purpose is to enable students of engineering and business administration to experience the realities of professional practice at the same time that they are studying the theoretical principles involved. The policies of Northeastern University have been built around this basic aim and have resulted in a highly successful educational plan, distinctively organized,

effectively administered and particularly fitted to its New England environment.

For New England is predominantly an industrial center¹⁰ with manufacturing the keystone of its commercial structure. There is, therefore, a basic need for vocational education of a broad, substantial type that will enable the youth of New England to cope successfully with the problems of industry. It was to assist in meeting this need that the School of Engineering was established in the Fall of 1909 with an enrollment of eight students, a faculty of four part-time instructors, and four co-operating agencies: The Boston and Albany Railroad, the Boston and Maine Railroad, the Boston Elevated Railway, and the Boston Consolidated Gas Company. Four of the students attended classes in the old Boylston Street Building of the Y.M.C.A. while their alternates were at work. At the end of each week the two groups exchanged places and the class work was repeated for those students who had been at engineering practice.

During this first year of co-operative endeavor, the Y.M.C.A. Building burned to the ground necessitating the establishment of

temporary housing for the new school at the Boston Young Men's Christian Union. Nevertheless, such were the vigor and persistence of the co-operative students and so ably did they demonstrate their capacity for sustained, productive effort that employers not only advocated a continuance of the plan, but also expressed a willingness to expand their co-operation. As a result by the Fall of 1910 the student body had grown to thirty-eight, the faculty had been suitably enlarged, and a number of new co-operating companies had been added to the original four.

The period from 1910 to 1913 was one of experimental development during which the new school, although handicapped by limitations of housing and equipment, proved its ability to fill a previously existing gap in the educational structure of the community. It became evident that the Northeastern Co-operative Plan could serve effectively an increasing number of young men of good mental ability but of limited means who might otherwise have been unable to obtain an engineering education.

By the Spring of 1913 when the first

class graduated (comprising four of the original eight students) four year curricula had been established in Civil, Mechanical, Electrical, and Chemical Engineering. At this time the School established itself in what is now part of its home, the Huntington Avenue Y.M.C.A., and for the first time enjoyed the stimulus of satisfactory classroom facilities and adequate laboratory equipment. Enrollment in co-operative courses had grown to 110 men, yet the school administration found it difficult to fill the constantly increasing requests from employers for co-operative students, so successfully had the early classes acquitted themselves. It is also worth noting that the period of alternation was lengthened from one week to two weeks, a modification of the original plan that reacted to the advantage of all concerned. During the next few years the School continued to show progress; its curricula were refined; its faculty was augmented by full-time instructors; and the administrative mechanisms of the co-operative plan were carefully worked out on the basis of experience. The war years (1917-1920) naturally saw a decrease in enrollment since

many young men were drawn for military service. In fact the facilities of Northeastern were placed at the disposal of the government during the great struggle.

An important milestone in the history of the School of Engineering was reached in March 1920 when the Massachusetts Legislature authorized the granting of appropriate engineering degrees. The increase in enrollment subsequent to the close of the World War made it necessary for the School to take additional quarters in the Gainsborough Building, adjacent to the Y.M.C.A., where an entire floor was rebuilt to provide classrooms, laboratories, and offices.

In September 1922 the School of Business Administration was established to offer four year day programs in Accounting, Finance, and Business Management, leading to the B.B.A. degree. Five years later this School was also placed upon the co-operative plan under the same administrative organization as that of the School of Engineering, the two schools forming the Day Division of the University and being operated as a single unit. This arrangement promoted the growth and the efficiency of both

schools and enabled a joint program of athletics and student activities.

Beginning in September 1929 the Schools of Engineering and Business Administration abolished their four year curricula and inaugurated in their stead five year programs of study leading to the Bachelor of Science degree with specification. The purpose of thus lengthening the courses of study was two-fold: First, to permit the inclusion of additional cultural material and second, to eliminate the undesirable concentration of technical courses that was necessitated on the four year programs.

The present year, then, finds the Day Division comfortably housed in the Huntington Avenue Branch of the Y.M.C.A., a Laboratory Building, and an adjacent property, known as the Huntington Building; with a substantial faculty of seventy-two men, with laboratory, classroom, and athletic equipment valued at nearly \$300,000; with a large, enthusiastic, and capable student body, a major portion of whom come from the New England States; and with over 300 co-operating companies representing nearly all types of engineering and

NORTHEASTERN UNIVERSITY

SCHOOL of ENGINEERING

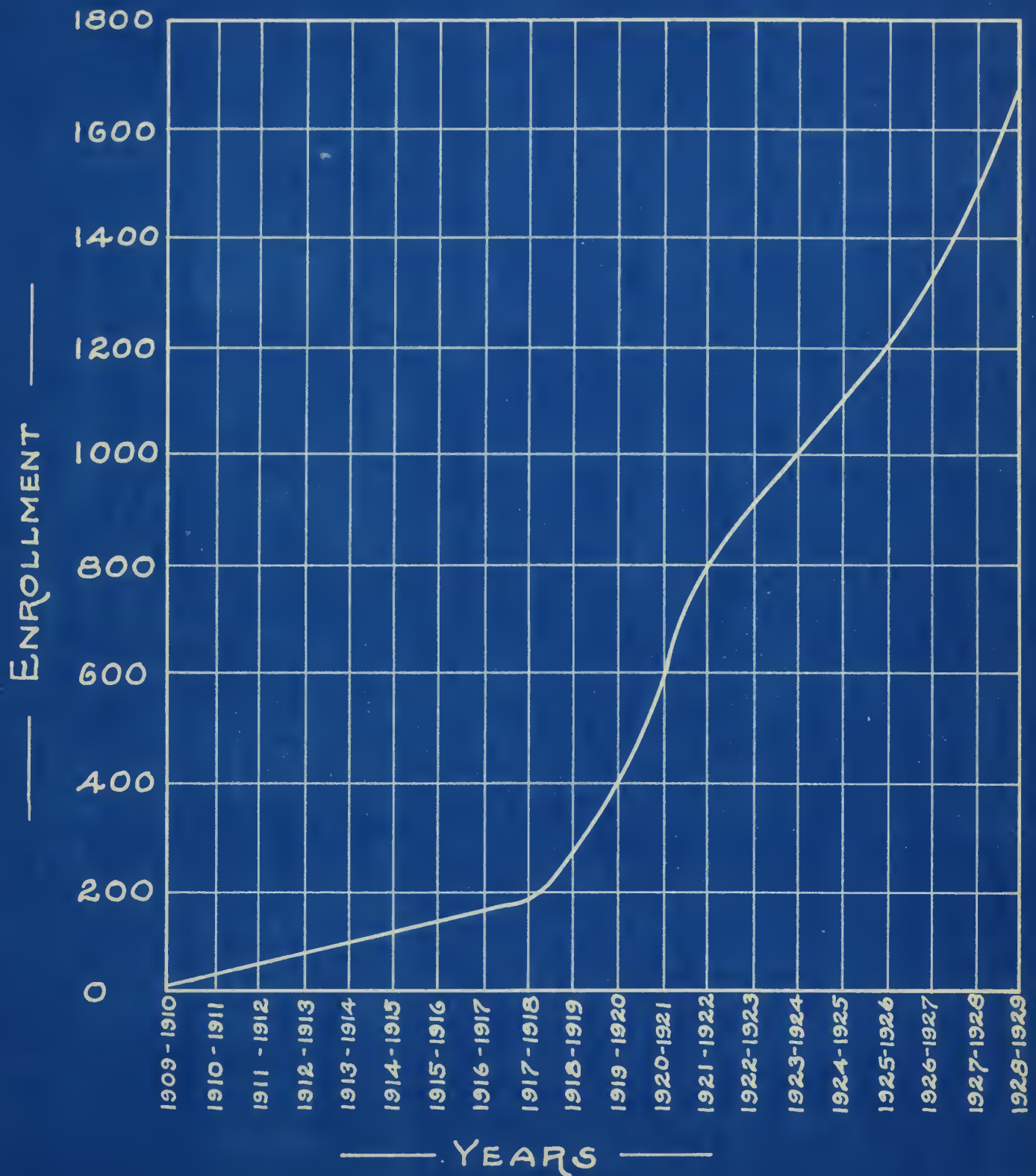


Figure II.

business enterprise.

An impartial estimate of the present status of the Day Division of Northeastern University was recently completed by Dr. Fred C. Smith of the Graduate School of Education of Harvard University who made an educational survey of the Schools of Engineering and Business Administration in 1929. The following excerpt from his report of this investigation indicates the standing of the Day Division twenty years after its establishment. It brings to an appropriate close this introductory chapter dealing with the origin and development of the co-operative plan and with the growth of co-operative education at Northeastern University in particular:

SUMMARY

"This survey of the Day Division of Northeastern University has revealed the following salient facts:

1. "Although the housing facilities of this institution are less than those of many colleges of equal student body, they seem to be adequate. This is made possible by scientific management of space and personnel, which results

in a very high 'percent of occupancy'. The equipment of the school is adequate, up-to-date, and used in an economic and intelligent manner. It is superior to many of the mid-west engineering schools, and compares favorably with the better schools.

"The school does not depend entirely upon student tuition, having an income from other sources equal to an endowment of over a million dollars.

2. "The professional and general preparation of the faculty and administrative officers of this school ranks high when compared with other engineering schools. Their professional spirit is commendable and the efficacy of the teaching process is beyond question. The turnover in personnel is lower than might be expected. This contributes to stability and continuity so desirable in education.

3. "The student body has been selected with care as only high standing secondary school pupils are admitted. A large percent of these students must earn part or all of their college expenses and this situation is much relieved by the scheme of co-operative education. One is impressed with the seriousness of the student group. They certainly are substantial citizens

in the making. This school is primarily a Massachusetts institution, seventy-five percent of the students being residents of this State.

4. "The curriculums of this school compare favorably with those of the better American engineering schools. The degree of difficulty of course content is sufficiently high to produce a high grade, intelligent, finished product. The courses are broad in scope, thus assuring well-grounded social and civic attitudes, as well as professional spirit. The minimum length of course for recognized college standing is one hundred twenty semester hours spread over a period of from three to four years. Northeastern, under the plan now in effect, is requiring a minimum of one hundred twenty-five semester hours of academic work (exclusive of the co-operative feature) extending over a period of five years."

PREFACE

The authors realize that this introductory chapter may appear unduly prolix in view of the avowed purpose of this theses: to study the guidance aspects of co-operative education. Yet it seemed essential to an adequate understanding of the main body of the thesis that this preliminary treatment of the background of co-operative education be included. After this somewhat extended prefatory comment on the philosophy of the co-operative plan and its development at Northeastern University we come next to a consideration of guidance problems of the freshman year.

Chapter 2

PROBLEMS OF THE FRESHMAN YEAR

THE NEED
FOR
GUIDANCE

That the need for guidance in no wise diminishes with the transition from school to college is clearly evidenced by the strikingly large percentages of students eliminated during their freshman year by our institutions of higher learning. Whether these freshman mortalities are attributable to inadequate preparation and guidance on the secondary level, or to faulty admission and orientation on the part of the colleges, or to both causes, is an open question. But the plain, unescapable facts cited by investigators of the situation leave no room for argument as to the size and scope of the freshman's problems.

RECENT STUDY
CONDUCTED BY
THE S.P.E.E.

Since the co-operative plan at Northeastern is adapted to engineering and business administration curricula it is appro-

priate to examine the results of a recent study¹¹. of admissions and eliminations of engineering students conducted by the Society for the Promotion of Engineering Education. The following salient facts relative to the admission of students to engineering colleges were established by the S.P.E.E. Committee.

1. The catalogue requirements for admission to engineering colleges in the United States and Canada are, in general, uniform and sufficiently high.

2. Nearly 20% of 8,728 students admitted to 52 representative institutions in the fall of 1924 were allowed to enter with conditions, or in other words, without meeting the full admission requirements.

Under these conditions the actual standards of admission are obviously only 80% effective. Accordingly the facts seem to indicate that it is not true "that nearly every student now entering our engineering colleges is endowed with enough native ability and vocational aptitude to

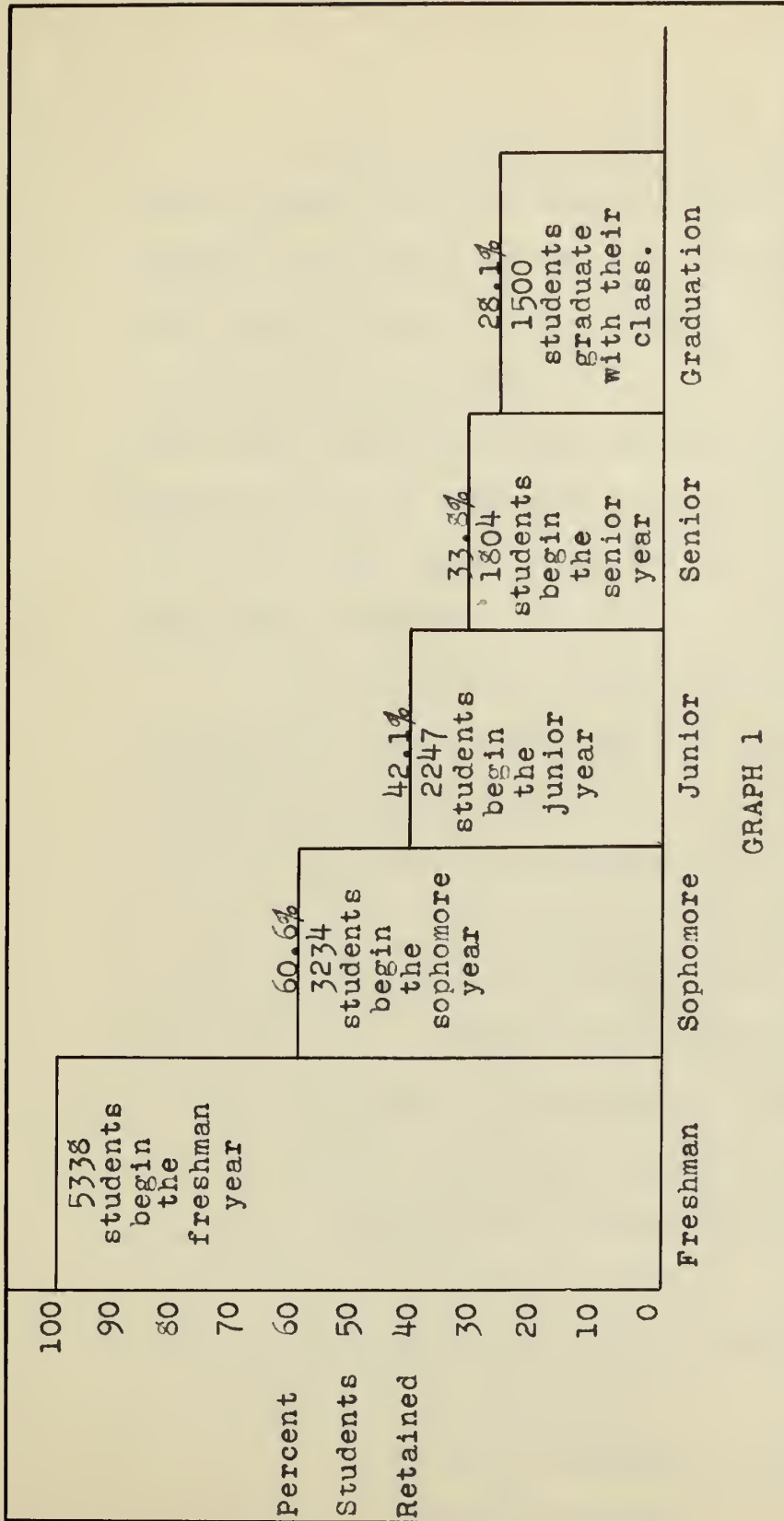
complete the first two years of college work with success." But granting the likelihood of there being a certain number of registrants who lack the ability to handle their scholastic work satisfactorily; yet the quantity of eliminations in our engineering colleges is far too large to be attributable to this cause alone. A consideration of the following statistics developed by the S.P.E.E. study mentioned above cannot but serve as impressive evidence that something is radically wrong in the process of transition from school to college. The data represent the average eliminations over a period of four years for 5338 students in 25 institutions. "Only those students who entered regularly, pursued regular courses of study, and graduated with their classes are included."

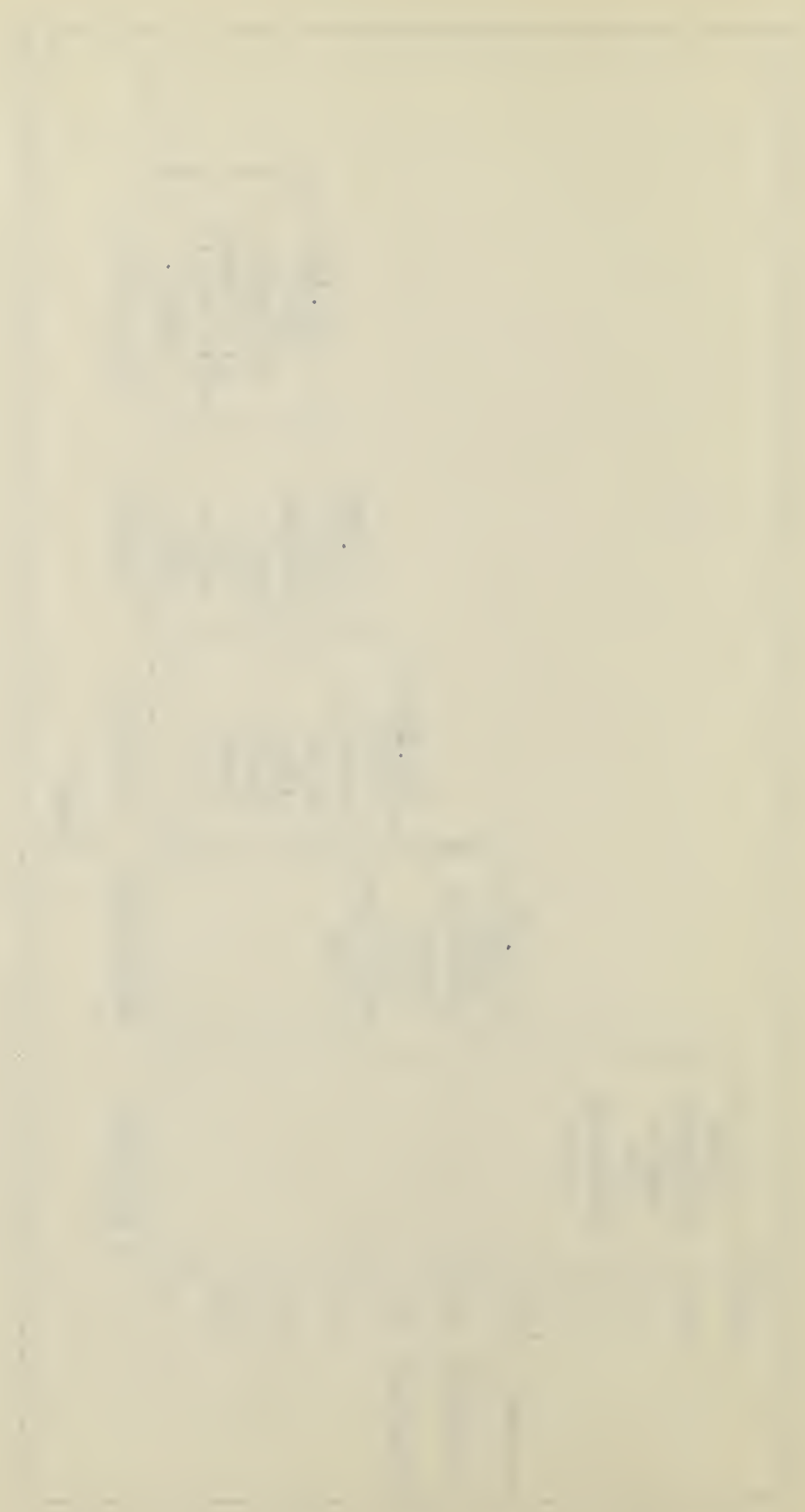
| Year | Number | Percent |
|----------------------------|--------|---------|
| Began Freshman Year | 5338 | 100.0 |
| Began Sophomore Year | 3234 | 60.6 |
| Began Junior Year | 2247 | 42.1 |
| Began Senior Year | 1804 | 33.8 |
| Graduated with their class | 1500 | 28.1 |

TABLE I

Showing average survival of engineering students
in 25 colleges.

A graphical representation of this situation shows, even more clearly than the foregoing table, the astounding percentages of eliminations from engineering curricula.





These figures reveal an extremely unwholesome situation among engineering schools in general in which on the average:

- (1) Forty percent of the students admitted are eliminated as freshmen.
- (2) Over seventy percent of the students admitted fail to graduate with their classes.
- (3) Less than forty percent of those entering can hope to graduate at all.

The S.P.E.E. Survey Committee analyzed the eliminations in twenty-three institutions with the following results:

53.8% of the students were eliminated
for scholastic failure.

15.1% of the students voluntarily
changed their courses.

9.1% of the students withdrew for
financial reasons.

5.5% of the students withdrew because
of poor health.

2.7% of the students were dismissed
for conduct.

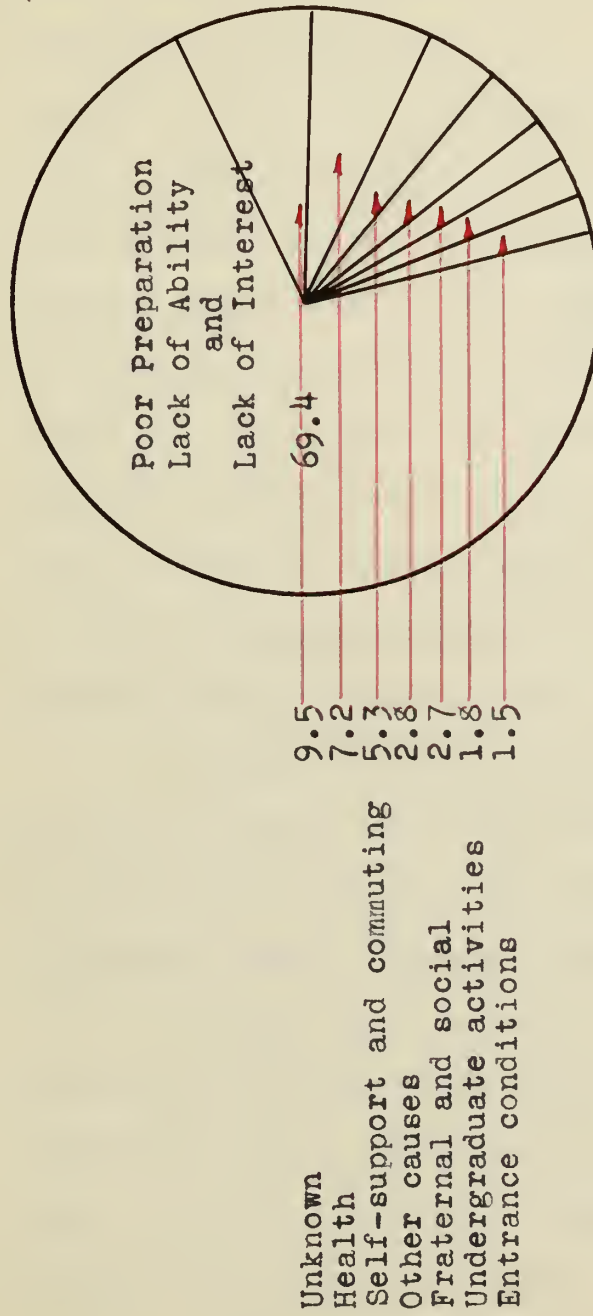
1.5% of the students withdrew for
family reasons.

2.7% of the students withdrew for
other reasons.

9.6% of the students withdrew for unknown reasons.

It is significant to note that over half of the withdrawals were caused by deficient scholarship. And this percentage is difficult to justify educationally in the light of the standards and selective processes of the institutions studied. Something must be wrong with subject matter content, teaching processes, or administrative procedures, when the mortality among engineering student bodies is as large as this. In discussing its findings on eliminations the S.P.E.E. Committee said in part: "The elimination rate is high and steadily growing higher.....We repeat that it cannot be true, in the main, that students fail and drop out of college because of lack of inherent natural ability."

The causes of scholastic failure were found to be several in number, varying in their importance as shown in the accompanying diagram:



CAUSES OF SCHOLASTIC FAILURE PER 100 CASES

GRAPH 2

Obviously this analysis is not clear cut since several factors may contribute to the failure of any single student. There is considerable overlapping and the graph serves only to give a rough idea of the relative importance of various causes. It should be noted that poor preparation accounts for only 15.6% of the scholastic failures. The cause of the majority of scholastic deficiencies is given as lack of ability and interest. This is really no single cause and would bear a keener and more detailed investigation.

Among the observations recorded at the conclusion of the S.P.E.E. Survey the following statement is of particular importance from a guidance viewpoint:

"Means must be found better to acquaint the prospective engineering student with what engineering really is, its scope, and the preparation essential to college success in this field.

"The matter of vocational information just alluded to demands more attention than has hitherto been given it by engineering

educators. In spite of the fact that most students have chosen engineering with serious purpose and high motives, the investigations, conducted by this Society and by several institutions independently prove conclusively that a large proportion of our student body has been admitted to and eliminated from engineering colleges without gaining any simple and usable concept of what engineering is. A great deal of the work of a modern engineer is done in the cloister of a drafting room or office and cannot be observed and understood as readily as the work of doctors, musicians, or other professional men. Furthermore, engineering has become highly differentiated and specialized. Only those can meet the challenge of the profession who are willing to undertake the rigorous training it requires after they have been correctly informed of its opportunities and rewards. Failures in college will be diminished materially when these conditions are fulfilled."

With this background of the conditions existing among engineering colleges

in general it is now appropriate to examine the situation at Northeastern in particular. First of all it is interesting to note the percentages of engineering freshmen who returned as sophomores over a ten year period. This is shown in detail in Table II below:

| Year | Number Entering | Returning as Sophomores | |
|---------|--------------------|-------------------------|--------------|
| | | Number | Percent |
| 1920-21 | 329 | 215 | 65.3 |
| 1921-22 | 408 | 260 | 63.7 |
| 1922-23 | 410 | 271 | 66.7 |
| 1923-24 | 420 | 276 | 65.7 |
| 1924-25 | 451 | 295 | 65.4 |
| 1925-26 | 519 | 367 | 70.7 |
| 1926-27 | 489 | 370 | 75.6 |
| 1927-28 | 602 | 441 | 73.2 |
| 1928-29 | 644 | 432 | 67.1 |
| 1929-30 | 623 | 479 | 76.9 |
| Total | 4895 | 3406 | Average 69.0 |

TABLE II

Retention of Students at Northeastern University
School of Engineering

Here again is evidence that something is amiss with educational methods when such a sizeable number of the freshman class is eliminated before the beginning of the sophomore year. Although the losses at Northeastern are somewhat less than those in the group of engineering schools investigated by the S.P.E.E., taken as a whole, yet there is ample reason to ponder why an average of 31% of a selected group of students should be eliminated annually before they have completed the first quarter of their college training.

In 1927-1928 Dean Carl S. Ell undertook a thorough study of the class that entered the School of Engineering of Northeastern University in the fall of 1927. This class originally comprised 602 freshmen of whom 72 or 11.9% withdrew during the school year. Another 89 or 14.8% simply disappeared during the summer months and failed to appear as sophomores. Dean Ell's analysis of the former group is included in Table III which follows:

CAUSES OF WITHDRAWAL OF FRESHMAN STUDENTS
DURING THE SCHOOL YEAR 1927-1928
NORTHEASTERN UNIVERSITY

| Cause | Number | Percent of Total Cases |
|----------------------------|--------|---------------------------|
| Scholastic Failure | 37 | 51.4 |
| Health of Student | 9 | 12.5 |
| Voluntary Change of Course | 3 | 4.2 |
| Financial Difficulty | 6 | 8.3 |
| Dismissal for Conduct | 1 | 1.4 |
| Family Reasons | 8 | 11.1 |
| Other Reasons | 1 | 1.4 |
| Unknown Causes | 7 | 9.7 |
| Total Cases | 72 | 100.0 |

TABLE III

Here again scholastic difficulty accounts for more than half of the failures. It should be realized of course, that any one of the other reasons listed may have been a contributory cause in the scholastic failure and withdrawal of the 37 students who were eliminated for scholarship. Studies of eliminations are somewhat unsatisfactory, unless it is possible to employ clinical methods, in that clear classifications seem to be almost impossible to obtain.

Nevertheless we do know that eliminations on the whole are too high. It seems possible that this mortality is due in part at least to inadequate or faulty guidance on the secondary level. A significant study of the pre-admission guidance of Northeastern freshmen was included in Dean Ell's investigation of 1927-1928. A copy of the questionnaire used in connection with the survey is included in the appendix of this thesis. Sections #16, #17, #18, #19, #22, and #23 bear particularly upon the matter now under discussion.

The questionnaire was filled out by 551 freshmen who completed the first ten-week marking period but for purposes of statistical analysis a group of 150 of these comprising the 50 highest ranking students, the 50 lowest standing students and the 50 middle ranking students was selected. The answers given by this key group were then carefully and completely tabulated. Only three of the most significant compilations are here reproduced but these will suffice to indicate the nature of the results without burdening the reader with onerous detail.

Basis of Choice of Engineering as a Life Career.

| Factors | Order of Importance | | | | | | | | | | | | | | | | | |
|--|---------------------|----|-----|---|-----|---|-----|----|-----|---|-----|---|---|---|---|---|---|---|
| | 1st | | 2nd | | 3rd | | 4th | | 5th | | 6th | | | | | | | |
| | H | M | L | H | M | L | H | M | L | H | M | L | H | M | L | H | M | L |
| 1. Advice of Parents | 2 | 5 | 14 | 3 | 6 | 2 | 3 | 5 | 2 | 4 | 2 | 1 | | | | | | |
| 2. Advice of Teachers | 1 | 3 | 2 | 1 | 2 | 4 | 4 | 4 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | | | |
| 3. Advice of Friends and Others. | | 3 | 2 | 6 | 6 | 5 | 2 | 2 | 5 | 4 | 2 | 6 | 4 | 1 | 2 | 1 | | |
| 4. Literature from N. U. | 1 | 1 | 1 | 1 | 4 | 5 | 1 | 1 | 5 | 4 | 3 | 7 | 3 | 2 | 1 | 2 | | |
| 5. Work done - associations from therein | 3 | 3 | 3 | | | | 3 | 1 | | | | 1 | | 2 | | | | |
| 6. Definite appeal to eng. work | 29 | 24 | 9 | 7 | 7 | 4 | 6 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 3 | 1 | | |
| 7. Supposed aptitude for engineering | 1 | 3 | 11 | 9 | 3 | 5 | 5 | 1 | 6 | 2 | 1 | 2 | 1 | 1 | | | | |
| 8. Enable earn good living | 1 | 4 | 4 | 6 | 4 | 6 | 9 | 11 | 6 | 6 | 4 | 3 | 5 | 1 | 4 | 1 | | |
| 9. Eng. prepares many lines of work | 5 | 2 | | 5 | 4 | 7 | 3 | 3 | 5 | 1 | 4 | 2 | 1 | 2 | 2 | 1 | | |
| 10. Coo-. plan oppor. for college ed. | 3 | 5 | 5 | 9 | 4 | 4 | 9 | 7 | 7 | 7 | 3 | 4 | 1 | 2 | 3 | 2 | 1 | |
| 11. Advertisements | | | | | | | | | | | | | | | | | | |
| 12. Others | | | | | | | | | | | | | | | | | | |

H - 50 High standing students; M - 50 Middle standing students; L - 50 Low standing students. This table gives the number of students checking each factor and the order of importance in which it was checked; i.e., 29 high standing students checked "definite appeal of engineering work" as being of first importance in their decision.

TABLE IV

Vocational Guidance in High School

| Factors | Number and Percent | | | | | |
|--|--------------------|----|-----------------|----|--------------|----|
| | 50High No. | % | 50Middle No. | % | 50Low No. | % |
| 1. Classes in occup. information | 1 | 2 | 3 | 6 | 5 | 10 |
| 2. Vocational guidance counselor | 4 | 8 | 9 | 18 | 4 | 8 |
| 3. Group counselling by teachers | 1 | 2 | 4 | 8 | 1 | 2 |
| 4. Individ. counselling by teachers | 14 | 28 | 15 | 30 | 8 | 16 |
| 5. Lectures by outside persons | 17 | 34 | 16 | 32 | 18 | 36 |
| 6. Prac. exp. indic. ability | 20 | 40 | 15 | 30 | 6 | 12 |
| 7. Advice based on tests | 2 | 4 | 4 | 8 | 2 | 4 |
| 8. Industrial or field visits | 15 | 30 | 14 | 28 | 12 | 24 |

TABLE V

This Table shows the total number of students checking the factor indicated as being of at least some importance to them as a vocational guidance factor in high school.

Why Students Choose to Come to Northeastern.

| Factors | Number and Percent | | | | | |
|--|--------------------|----|-----------------|----|---------------|----|
| | 50High No. | % | 50Middle No. | % | 50 Low No. | % |
| 1. Advice of Parents | 17 | 34 | 18 | 36 | 23 | 46 |
| 2. Advice of High School Teachers and Principals | 13 | 26 | 13 | 26 | 16 | 32 |
| 3. Friends now in N.U. | 17 | 34 | 22 | 44 | 25 | 50 |
| 4. Athletics | | | 2 | 4 | 5 | 10 |
| 5. Other student activities | 1 | 2 | 1 | 2 | 2 | 4 |
| 6. Coop. plan for earning | 38 | 76 | 37 | 74 | 40 | 80 |
| 7. Desire for practical work | 29 | 58 | 25 | 50 | 33 | 66 |
| 8. N.U. appeal as eng. work | 18 | 36 | 19 | 38 | 23 | 46 |
| 9. Literature read'd from N.U. | 16 | 32 | 13 | 26 | 9 | 18 |
| 10. N.U. ads in High School magazines | 5 | 10 | 4 | 8 | 14 | 28 |

TABLE VI

This Table gives the total number and percent of students, by groups, checking the factor indicated as being of at least some importance to them in forming their decision.

Among the conclusions that seem warranted by an examination of the data tabulated are the following:

1. "Definite appeal of engineering work" is a factor of first importance in the decisions of a large majority of high ranking students. It is also a factor of first importance in the decisions of nearly half of the middle ranking students. With the low ranking students, on the other hand, "Advice of Parents" becomes a factor of first importance with the greatest number. This seems to be indicative of a tendency among those students who chose engineering curricula because of a definite attraction towards the profession to do better scholastic work than their less interested fellows who undertook engineering careers primarily upon the advice of parents.

2. Although the tabulation is not shown here, it appeared from a careful treatment of the data that there was no significant correlation between the time of making a decision to study engineering and scholastic achievement at Northeastern.

3. An examination of Table V suggests that "Individual Counselling by Teachers", "Lectures by Outside Persons", "Practical Experience Indicating Ability", and "Industrial or Field Visits" are the most common means of vocational guidance in high schools. "Classes in Occupational Information" are few and far between. "Professional Guidance Counselors", "Group Counselling by Teachers" and "Advice Based on Tests" apparently receive but little attention.

4. Table VI indicates that the "Co-operative Plan" is the chief attraction to Northeastern among all three groups. Next in importance comes the "Desire for Practical Work". It is significant that the fifty lowest ranking students were much more greatly influenced by advice of parents and friends, and by advertisements in High School Magazines than the high and middle ranking groups. The poorer students seem to be more attracted by athletics than those of high scholarship, but the number of cases is too small to justify any significant conclusions in this respect.

5. An interesting general aspect of the survey is the fact that, on the basis of the 150 cases studied, about one quarter of the freshmen had had no guidance whatever. Approximately half of the remaining 75% of the group had had guidance in one way only.

In the light of this background as to the guidance previously given to these entering students we may next examine the guidance activities of the freshman year, since in a later chapter of this thesis it is proposed to investigate the efficacy of the whole program of guidance in school and college by means of another study of the same group of students (now seniors). As the program of freshman guidance at Northeastern has been experimentally worked out and carefully organized it may be well to outline it in some detail.

All freshman advisory work is under the direct supervision of a Dean of Students who administers the program of guidance for freshmen through a corps of advisors and a clinical psychologist. Members of the teaching faculty who serve as freshman advisors are given relatively light instructional loads in order

that they may have adequate time for individual counselling with their advisees. To each is assigned thirty or forty freshmen, and to this group the advisor assumes what amounts to the relationship of a friendly uncle. Advisors keep regularly scheduled conference hours during which they endeavor to become adequately acquainted with each student's personality and circumstances. All freshmen receive their course grades from their advisors, a procedure which permits the timely discussion of scholastic problems and difficulties. The fact that the student becomes fairly intimately acquainted with his advisor is most advantageous since it enables the latter to give advice, caution, information, encouragement, censure, and so forth, intelligently; i.e., in the light of the student's background and needs.

Years of experience have demonstrated that this friendly semi-official relationship between the freshmen and their advisers is of great value in assisting mal-adjusted freshmen to "get on their feet". It is also a valuable kind of preventive work in that not infrequently

the contact of the advisor with his freshman results in the re-direction of attention and energy from destructive and anti-social directions to constructive and socially approved ones. In serious questions relating to scholarship and discipline the advisor aids invaluablely the administrative officers of the school in their efforts to take wise and enlightened action.

All in all, it has been our experience that while a large half of the freshmen would get on quite comfortably without the aid of an adviser, the other half profit greatly by his acquaintance and his aid. It seems fair to conclude that those students who cannot make the grade are eliminated more quickly and more painlessly and that those who remain do a better quality of work and offer fewer disciplinary problems because of the activities of the freshman advisors.

MENTAL HYGIENIST

Severe cases of scholastic failure, discipline, and problems of general social adjustment are referred to a mental hygienist, a full time member of the faculty, who has had extensive clinical experience in psychology

and psychiatry. Collaborating with the numerous hospitals and clinics located within easy reach of the University, this mental hygiene officer utilizes the best of the more recently discovered investigational and therapeutic techniques. The range of problem cases with which he has to deal is great indeed, extending from downright psychosis at the one extreme to academic failure traceable to excessive mental ability at the other. Occurring more frequently, however, are cases of inferior study techniques, poorly developed life purpose, unwholesome parent-child relationships, poor attitudes toward authority, handicapping personality traits, and debilitating emotional conflicts of various kinds. In many instances the work of the mental hygiene officer is chiefly that of fact-finding, the solution of the student's problem resting in the hands of others in the University. It is a matter for gratification that the various administrative officers have co-operated so completely in the reconstructive work recommended by the consultant. In other cases, involving medical,

psychiatric, or serious re-education problems, recourse is had to facilities outside the University.

VOCATIONAL GUIDANCE

The guidance activities so far presented have to do with the academic and general social relationships of the freshmen. It is not to be inferred from this that the vocational guidance aspect is neglected. This phase of the guidance program is a responsibility of the Department of Co-operative Work, one of the five main departments of the Day Division. The Department of Co-operative Work comprises seven coordinators, under the supervision of a director, who devote their entire time to the vocational guidance of students in the several branches of engineering and business. The work of co-ordination is obviously of signal importance in the development of students on the co-operative plan. It has for its social aim the guidance of students in the co-operative solution of vocational problems and for its individual aim the assistance of students in planning their own professional careers.

In the course of the freshman year, the student is interviewed periodically by a co-ordinator who discusses various fields of business and engineering activity with a view to determining that phase of the work toward which the student should aim. The advantages and disadvantages of different jobs are considered frankly; the requirements of one type of work are contrasted with those of another; and the student's questions, which usually arise by the score, are carefully answered to the best of the co-ordinator's ability. It is naturally true at the present stage of the guidance movement that many such questions cannot be adequately answered with any degree of exactness; but in every case the best available information is given so that the student may at least analyze his own problem in the light of the facts which are known to affect it.

In addition to these personal interviews with co-ordinators, a series of informal talks by the Director of Co-operative Work, guidance authorities from outside the University, and heads of professional departments,

is arranged for the freshman class. At these meetings, which culminate in an open forum, the more general phases of the vocational problem are outlined and discussed. Such matters as "Getting a Job", "Interviewing a Prospective Employer", "Progressing in Business" are typical of those which are covered. And further, students are periodically furnished with pamphlets especially designed to convey significant information relative to the various opportunities in specialized fields. A selected vocational guidance library in the office of the Department of Co-operative Work, always available for student use, supplements these.

The scholastic program of the initial year in the School of Engineering is common to students of all engineering curricula and that of the School of Business Administration is the same for students in all business curricula. Specialization is deferred until the student shall have had an opportunity to make an intelligent choice of objective. Thus in the course of the year freshmen are brought to a clearer understanding of the educational and

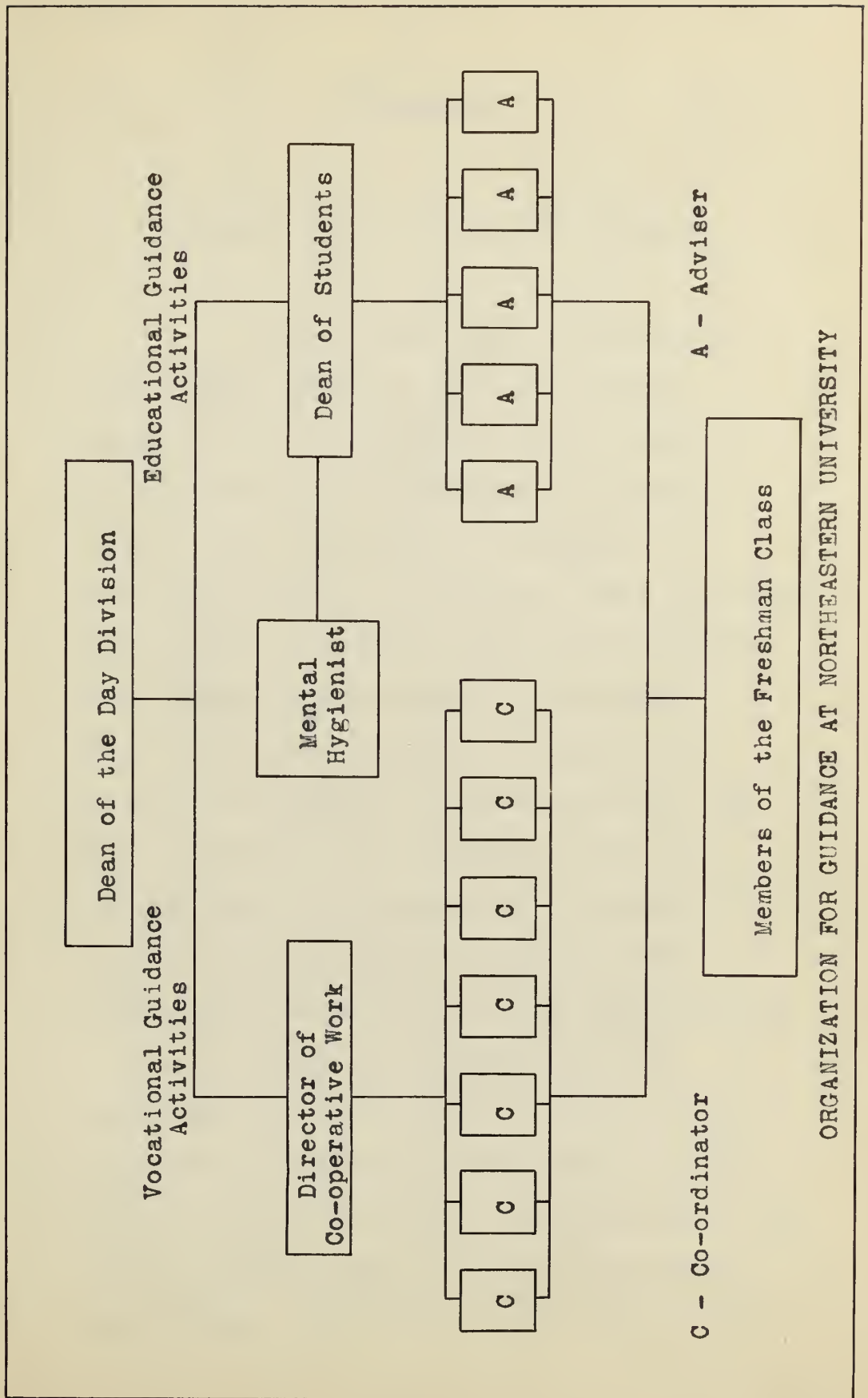
vocational implications of the courses of study in which they have enrolled. Under the guidance of their faculty advisors and co-ordinators, at the end of this first year of co-ordination, they choose a curriculum and an occupational objective which seems best suited to their needs.

It has previously been stated that approximately 30% of the entering class is eliminated before the sophomore year. However, it is the aim of the University never merely to drop a man because he does not seem to fit into the scheme of things at Northeastern. While it is desired that only those students be retained who are equipped to profit by the co-operative program, yet it is also desired that those who are asked to withdraw be assisted in finding a plan of action better suited to their needs so that they may not feel that they have simply been eliminated as failures. In view of its selective system of admissions the University feels a definite responsibility for every student who matriculates. Accordingly, when students are requested to

withdraw they are not perfunctorily dismissed as incompetent; they are shown why it is inadvisable for them to continue and given the sincere counsel of the guidance staff concerning other fields of occupational endeavor in which they will be more likely to succeed.

This detailed discussion of freshman guidance at Northeastern may lead to the suspicion that the concern of the University for the general well being and the total personality of its students has led to the surrounding of the students with too many ready-made solutions for their problems. That such a criticism would not be warranted, however, seems to be indicated by a consideration of the situation as a whole, which may be summarized as follows: Our youths at college are emerging from the sheltered life of the home, are at a time in life when the intensity of their passions and enthusiasms and the extent of their desire for new experience tend to drive them to courses of action, the meaning and consequence of which their limited knowledge of this complex world does not always equip them to meet effectively. It follows that while every young

man should be given wide opportunities to learn by his own experience, it is in his permanent interests and in society's permanent interest as well for him to receive the benefit of timely counsel, information, and guidance. The old regime of wild oats and unregulated trial and error learning in many of the vital matters of life, to be sure, produced many a robust personality but it also produced a quantity of neuroses, inefficiency, and human tragedy, which is incalculable. In the refinement of our social economy, one important advance lies in the perfection of our techniques for the building of more sound personalities and responsible citizens.





Chapter 3

COUNSELING THE CO-OPERATIVE STUDENT

In her recent book, "Counseling the College Student," Helen D. Bragdon concludes "that counseling in its truest sense means mutual deliberation, consultation, and interchange of opinion. It therefore excludes instruction under authority, prescription, dictation, or mere diagnosis". This definition of counseling expresses the keynote of the guidance program for co-operative students at Northeastern. The aim underlying all guidance activities is to enlighten the student, to be helpful to him, to encourage him, but to make him responsible for arriving at his own decisions.

Before the beginning of the sophomore year the student is faced with the necessity of making two important choices: he must choose his field of concentration and he must decide upon his first co-operative assignment. The first of these matters has

already been discussed in some detail in Chapter two; the second now presents itself for consideration. In accord with the principles already considered, students are not arbitrarily assigned to co-operative jobs. Neither is it always possible to procure for every student exactly that particular job that would apparently be most desirable for him. The School has effected co-operative relationships with over three hundred suitable companies, yet the number of positions available in any one field, of any one type, and at any one time is necessarily limited. Thus it happens that the co-ordinator discusses certain available jobs with his advisees, outlining the nature and requirements of each, suggesting the character of the experience to be had, and pointing out the advantages, disadvantages, and relative values of the training offered.

In the light of this information the student chooses a job to which he would like to be assigned. The acceptance of a co-operative assignment is voluntary, since it is felt that compulsion is both wrong from a guidance point

of view and unsound from the standpoint of the employer. At the same time it is believed that training in getting a job should be part of the experience of every co-operative student. "In securing a job", writes a capable employment counsellor, "there is as much need for proper technique as there is in golf, or in playing the piano." Consequently, after the student has decided upon the available opportunity that seems best to fit his needs, he is given a card of introduction to the employer and sent for personal interview. It then becomes the student's responsibility to impress the employer favorably and to get himself accepted for the particular job in view.

In this interview with the employer the student is further acquainted with the requirements of the work and with the particular rules and regulations of the company concerned. He is still at liberty to reject the job if any of the information developed in the interview with the employer causes him to change his mind. If he is accepted for the job, however, the student still has a trial week in which actually to acquaint himself with the realities of the job before his contract to work on it in alternation with another student for the period

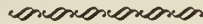
of one year becomes binding. It is considered a vital part of the practical training of each student thoroughly to impress upon him the value of proper analysis of obligations about to be assumed and the importance of fulfilling them after they have been assumed. Therefore, every student must enter into an agreement with the University at the time he accepts his co-operative work assignment. The form shown on the following page is used.

Although most co-operative assignments extend over the period of one year, in some cases training programs are arranged with the larger companies extending over two, three, or four year periods. In such cases the preliminary consideration of the proposed program of co-operative work by the student is more extensive and more detailed than is the case for shorter assignments. Likewise, more selective methods are used by the employers in order that the chances of placing students who are not adapted to the work may be minimized. Every candidate for a training program must meet the following requirements:

NORTHEASTERN UNIVERSITY

Department of Cooperative Work

Agreement



I, Course.....
(Name of Student)

Employing Firm

Year..... Division..... agree to work with

.....
on the regular cooperative plan in accordance with the regulations issued by the Department of Cooperative Work.

Rate of Pay

I agree to accept the wages of.....per....., this amount to be increased as my ability and other conditions may warrant.

Term of Employment

I understand that I am to work on this job until released or transferred by the Department of Cooperative Work, the minimum extent of employment being one year from date including the regular summer working period unless otherwise specified below. This agreement does not bind my employer to continue my services any longer than it is practical to do so. *I will not leave nor arrange with my employer to be relieved of this job* without the approval of the Department of Cooperative Work.

Credit for Degree

I realize that my work on this job is part of the requirements for a degree and that credit will be given only in return for satisfactory service to employer and the proper handling of the job.

Educational Certificate

In accordance with the laws of the Commonwealth of Massachusetts, I shall obtain the necessary working certificate before starting work on this job.

Signature
(Student)

Age

Address while at work.....St.

Tel.

.....(City)(State)

Signature
(Co-ordinator)

Date

1. The student's physical condition must be unquestionable. Robust physique is essential to successful achievement on the training plans.

2. The student must read the plan of co-operation with the particular company concerned and discuss it thoroughly with his co-ordinator and with his parents. Written consent of the parents is required before a student can become a candidate for a training program.

3. The student must meet the specific requirements of the company offering the training program and must have no academic failures.

4. The student must clearly understand that he is contemplating a continuous practical training program of several years, with after-graduation opportunities with the company or affiliated companies as the objective. It should be noted, however, that the company does not promise to give after-graduation employment to the student nor is the student obliged to stay with the company after graduation. Several typical training schedules are shown herewith:

I. Four-Year Program of Co-operative Training
With Hunt-Spiller Manufacturing Corporation.

First Year

General laboratory and plant work
Preparation of samples

Pyrometry
Use and
care of
metallur-
gical ap-
paratus

Second Year

Complete analysis of coal, coke, limestone, sand,
iron, oil, etc.

Third Year

Keeping of general metallurgical records, filing,
and making of reports.

Fourth Year

Analysis for combined, graphitic, and total
carbon with a complete knowledge of a carbon
combustion apparatus.

II. Three-Year Program of Co-operative Training
With Simplex Wire and Cable Company.

(Note: The first two years are devoted to
general plant training which is primarily the
same for Electrical, Mechanical, and Chemical
students, except that the schedules are designed
to give more extended training in the departments
most closely allied to the course of study. The
senior year is devoted entirely to the depart-
ment for which the student is studying)

First Year

Insulating Department, Braiding Department, Cable
Department

Second Year

Twisting Department, Machine Shop, Plant Con-
struction

Third Year

Electrical Testing or Drafting Room or Chemical Laboratory

III. Three-Year Program of Co-operative Training
With Western Electric Company

First Year

Preanalyzation Department, Wood Work and Wood Finish, Metal Working and Plugs, Metal Finishing

Second Year

Central Office Apparatus, Sub Sets and Coin Collector, Desk Stands and Dials, A.T. and T. Instruments

Third Year

Cable Terminals, Switchboard Wiring, Inspection

IV. Three-Year Program of Co-operative Training
With Dennison Manufacturing Company

First Year

Carpenter Work, Electrician's Helper, Millwright Work

Second Year

Machine Shop Stock Room, Grinding Room, Machine Shop

Third Year

Filing Tracings, Blueprinting, Drafting Room Records, Detailing, General Drafting

The fact that the majority of co-operative students are not assigned to fixed training courses does not mean that they remain continuously on one job throughout their co-operative work program. Only the larger companies have facilities that permit them to offer broad programs of sequential training extending over a period of several years. Therefore, students who are employed by the smaller companies are transferred at appropriate intervals, usually at the beginning of the school year in September, so that their training may be both progressive and varied.

The co-operative Training is as thorough and complete as the academic work. Students are placed with companies in which the experience available will be worth while as a foundation to later professional practice. No attempt is made, however, to arrange the co-operative work in a particular sequence with the scholastic curriculum. It is planned, rather, to schedule the engineering practice in such a way that the student's working experiences shall be progressively more responsible.

For students who have not found their specific vocational objectives early in their college course and who consequently need a maximum of exploratory opportunities the training programs are not desirable. The fixed training programs require continuity of service in specified jobs over a period of years, a requirement that is distinctly disadvantageous to the student who is still feeling his way along vocationally. This is another reason for limiting the number of training programs.

More important than the particular job upon which a student is engaged at any time is the correlation of his scholastic studies and his working experiences. Accordingly a number of means have been established in the endeavor to effect a continuous and thoroughgoing co-ordination of classroom activities and co-operative work. The first of these co-ordinating activities is the Co-operative Work Report.

Every co-operative student is required to prepare and submit a detailed report upon some phase of his working environment three

times annually. As a rule the first report is an analysis of the job. Its purpose is to encourage the student to make a systematic and careful study of his co-operative assignment. Certain suggestions are made to him in the way of a job analysis outline but the treatment of the subject and the organization of the report are left to the initiative and ingenuity of the student. On the pages following are shown the types of questions that a student is urged to think about in the preparation of his paper. It should be understood in this connection that the mere submission of answers to these questions does not meet the co-operative work report requirement. Each report must represent a painstaking investigation on the part of the student and must demonstrate his ability to do some independent thinking on the subject.

Later reports are written upon subjects related to the student's co-operative work, such subjects receiving the prior approval of the coordinator. In this way the student is encouraged to develop his powers of observation and to direct his energies toward worthwhile ends. These reports are carefully read and graded by

Northeastern University

Day Division

JOB ANALYSIS SUGGESTIONS

Our tendency on any job is to view it as a job only and to consider as our experience only that which we are doing with our hands. The real value of any working experience is the development of certain intangible personal qualities which are acquired through contact with our fellow-workers and our working environment, as well as from the actual doing of the job assigned to us. These personal qualities are developed by careful observation and study of our working environment. No matter how menial the task to be done, it has its educational possibilities for a thinking person.

DUTIES AND
RESPONSI-
BILITIES

First, you should know the duties and responsibilities of your job and perform them well. No one is ever given major responsibilities to shoulder, until he has demonstrated his capacity to handle minor responsibilities.

Therefore, enumerate all of the duties and responsibilities of your job. What must a worker know in order to handle your job? What are the physical requirements? What are some of the things which can be learned from this job that will be helpful in handling the next higher job? a job in some other department?

EQUIPMENT
AND
MATERIALS

Second, what equipment and materials have been entrusted to your care? What did they cost? How many different makes of the similar equipment or materials are there (not only in your own establishment but elsewhere)? Where were they made? How and by whom? Why are they there and for how long? Do any obvious improvements occur to you?

Third, what other equipment and materials are there in your working environment, not necessarily entrusted to your care? Analyze those as suggested above.

PERSONNEL
FACTORS

Fourth, what is the personnel organization chart of your department? What kind of people comprise it? What are they doing? How long have they been doing it? Why? How did the head of your department get his job? What are some of his duties and responsibilities?

COSTS

Fifth, what is the cost to the employer of the work you are doing? What elements enter into the cost? What is the cost of doing other units of work in your department? What is the system of wage payment in force on your job? What are some of the advantages of this system to employer? to employee? What other systems of wage payment are there?

ORGANIZATIONAL
SCHEME

Sixth, what are some of the other departments of the business? What are their functions? What

relationship is there
between the department you
are working in and the others?
What relationships are there
between the several departments
and the chief executives of the
business?

COMMENTS

What comments or criticisms have
you on any phases of the job?
Substantiate these with reasons.

members of the Department of Co-operative Work and later discussed with the student himself. Frequently it happens that co-operative students make suggestions relative to the operation of the work upon which they are engaged that result in increased efficiency. An instance of this occurred not long ago at the warehouse of a large grocery company which carries on a training program for students of industrial engineering and business administration.

A co-operative student assigned to the department in which orders were assembled for retail distribution felt that certain improvements could be made in the system then in use for grouping and checking goods for shipment. He talked the matter over with his foreman who urged him to report his suggestions in writing. When the boy did this, the foreman discussed the items in question with him, pointing out the reasons why the proposed changes would be inadvisable in the light of previous experiences, but at the same time suggesting that the student submit further ideas if he cared to.

This led the youngster to talk with other employees about various phases of the work with the result that the whole department became interested in working out a more effective layout of assembly equipment. In his next co-operative work report the student elaborated upon this theme and from the interview with his co-ordinator which followed he took away several new points of view. Eventually, a highly effective plan was adopted by the company, resulting in a substantial saving of time and money in the department involved. Although the student alone did not work out the final solution, yet his alertness and youthful ardor were responsible for arousing the whole personnel to a renewed interest in departmental problems.

Employers are always looking for good ideas from their employees, and co-operative students have shown themselves especially fruitful in this respect. The boy who is under the twin disciplines of study and work is ever on the alert for new ways of doing things. What's more he learns through rubbing elbows with his fellow workers that all the wisdom of the world is not contained between the covers of college textbooks; and he acquires that most

important attribute which cannot be taught in the classroom: the ability to get along with people in different walks of life.

A second means of co-ordinating the theoretical and the practical aspects of the student's program has already been mentioned in connection with report writing; namely, the periodic interviews with co-ordinators. Not only does the student confer with his co-ordinator during school periods, but also the co-ordinator visits the student on the job and talks with the employer. In addition each student receives a report card at the close of each five week period of work, which he fills out in part and leaves with his immediate superior on the job. The employer then ranks the student on a rating scale and returns the card to the Department of Co-operative Work. The report card used by engineering students is shown on the following page.

Thus the co-ordinator is in a strategic position to act as vocational counselor for the students under his charge. He knows them well personally, he reads

Northeastern University, School of Engineering
REPORT ON CO-OPERATIVE WORK

This card is to be filled out by the student, left with the employer for his remarks, and mailed by the employer to the school.

All data on this report apply only to the working period preceding the date of this report, unless otherwise specified under "Remarks."

Name _____ Date _____
 Course _____ Engineering. Division _____ Class _____
 Address (during work period) _____ Street _____
 City _____ State _____ Tel. _____
 Employing Firm _____ Department _____
 Name of your Immediate Superior _____
 His official position _____
 Working hours: Daily from _____ A.M. to _____ P.M. Sat. to _____
 Times late _____ Cause _____
 (Use Figures)
 Times absent _____ Cause _____
 (Use Figures)
 Rate of pay per { Hour _____
 { Week _____ Pay for full period _____
 Remarks _____

Fill out other side

TO BE FILLED OUT BY EMPLOYER

The employer will please express his candid opinion of this student as a worker in his employ. Criticisms and comments are earnestly solicited. This information will be utilized for the guidance of the student and the improvement of the co-operation.

Utilize form or not, as you prefer.

(Mark with cross (X) the grade you wish to indicate for each characteristic.)

| Characteristic | Superior | Above Average | Average | Below Average | Inferior |
|----------------|----------|---------------|---------|---------------|----------|
| Application | | | | | |
| Aptitude | | | | | |
| Initiative | | | | | |
| Confidence | | | | | |
| Reliability | | | | | |
| Accuracy | | | | | |
| Personality | | | | | |

Remarks _____

Signature of Firm's Representative

PLEASE MAIL EARLY



TO BE FILLED OUT BY STUDENT

Estimate the number of days devoted to each duty during the work period just completed and insert in the adjacent column. If your duties are not listed in this classification, insert them in the blank spaces under the proper headings.

| DUTY | Days | DUTY | Days |
|---------------------|------|----------------------------|------|
| NOT WORKING | | AUTOMOBILE WORK | |
| SURVEYING | | | |
| Rodman | | LOCOMOTIVE WORK | |
| Instrumentman | | | |
| Chief of Party | | | |
| | | CAR REPAIR | |
| DRAFTING ROOM | | | |
| Blue Printing | | WOOD WORKING | |
| Drafting | | | |
| Tracing | | | |
| Designing | | ELECTRIC WIRING | |
| Estimating | | | |
| | | ELECTRIC APPARATUS | |
| | | † Installation | |
| CONSTRUCTION | | † Assembly | |
| Timekeeper | | † Repair | |
| * Mechanic | | † Testing | |
| * Helper | | | |
| * Inspector | | | |
| * Foreman | | | |
| Material Clerk | | DISTRIBUTING LINES | |
| | | | |
| DESIGN | | TRANSMISSION | |
| Computing | | | |
| Checking | | | |
| | | | |
| MACHINE SHOP | | SUB-STATION | |
| Bench | | | |
| Lathe | | SWITCHBOARD | |
| Drill | | | |
| Miller | | ELECTRICAL LAB'Y | |
| Planer | | | |
| Shaper | | | |
| Automatic | | | |
| Assembly | | CHEMICAL WORK | |
| Inspection | | Sampling | |
| | | Laboratory Ass't | |
| | | Qualitative Anal. | |
| FOUNDRY | | Quantitative Anal. | |
| General | | Special Anal. | |
| Core Making | | Testing | |
| Moulding | | Research | |
| | | Inspection | |
| | | Store Room | |
| POWER PLANT | | Production | |
| Boiler Room | | | |
| Engine Room | | | |
| | | | |
| FORGING | | OFFICE WORK | |
| | | Sales | |
| BOILER SHOP | | Cost | |
| | | Receiving | |
| | | Shipping | |
| SHEET METAL WORK | | Personnel | |
| | | General | |
| STRUCTURAL STEEL WK | | | |
| | | TEACHING | |
| | | Laboratory Ass't | |
| Specify Trade | | †Specify kind of Apparatus | |

C.

their reports, he investigates their industrial assignments so that he understands their successes and failures; in short, he has all the available facts upon which to build his advice. Problems that arise at work are talked over with a view to developing the student's sense of values and his personality as well as to advancing his immediate status on the job. Conferences are held regularly on a friendly but business like basis, the "head to head" talk being preferred to the time honored, but somewhat shopworn "heart to heart" exchange of confidence.

To further promote an understanding among students of those attitudes and modes of conduct which are most conducive to vocational success, regularly scheduled classes in co-ordination are held during school periods. Each section elects its own chairman and secretary from among its members, organizes as a student branch of the professional society for the particular field in which the group is interested, and carries on a study of case problems in vocational guidance under the auspices of a co-ordinator. In this connection Northeastern students maintain very live and

active branches of the American Management Association, the Boston Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Chemical Society, and the American Society of Industrial Engineers. Each student carefully prepares a paper bearing upon some phase of his working environment which he presents to his classmates for consideration. Discussion leaders, who have had previous opportunity to study the problem being presented, comment upon the talk and open up the moot points for general consideration. It is not infrequent to find 100% student participation in the vigorous discussions which develop over controversial questions. The co-ordinator does not direct the procedure; his function is rather to remain in the background as an interested observer, whose advice is available when it is desired. When the faculty member does participate it is primarily to guide discussion into those channels which are likely to prove most profitable or to emphasize some point of particular importance.

Still another means is effective in relating the student's program of study to his engineering practice. During his senior year, as part requirement for the degree, each student prepares an original thesis upon some subject in his professional field. These thesis investigations are frequently carried on at the plants of co-operating companies where the student undertakes the solution of some problem of commercial significance. In connection with this thesis work students often group themselves into seminars under the guidance of a faculty member who leads discussions centering around the common problems that arise. In this way the students are brought to realize the practical applications of the theoretical work they are doing in the classroom. Co-operating employers, too, have been found to be interested in assisting the students in their employ to see the ways in which various theories actually work out in practice.

Yet another phase of the program of

co-ordination comprises a series of special lectures given to juniors and seniors and covering important types of engineering opportunities available to college graduates. The purpose of these lectures is to help the upperclassmen to determine upon a specific vocational objective within their professional fields. The addresses are given by practicing engineers experienced in special phases of engineering work and are intended to supplement the vocational information gained by students on the co-operative plan. Group visits to conveniently located and appropriate industrial plants are also arranged when such inspection trips seem likely to be profitable to the students.

In all these different ways the student's work and study are integrated into a coherent whole. 13 "As a form of vocational guidance the co-operative plan of education has marked advantages. In the course of his varied experience at work, the student has an opportunity to see and know at first hand what is demanded of men in various positions. His experience also enables him to know with cer-

tainty what kinds of work he is going to find congenial, what kinds are compatible with his already fixed qualities of temperament and character and finally what kinds are likely to lead to the ultimate position which he hopes to hold. It provides an opportunity at graduation for the immediate selection of a field of work for which the student is adapted and the avoidance of years of expensive training in a field in which the student may later find himself entirely unfitted."

Chapter 4SURVEY OF CO-OPERATIVE INDUSTRIES AND
DISTRIBUTION OF CO-OPERATIVE JOBS

In order to facilitate a ready understanding of the survey of the types of jobs and branches of industries co-operating with Northeastern, it may be well first briefly to consider the objectives of the co-operative plan as organized at Northeastern University. Although the principal objective of the plan is to co-ordinate a thorough academic training with a substantial practical experience, nevertheless the social, physical, and cultural phases of college life are adequately provided for.

Students matriculate who have already arrived at a tentative decision in favor of a general vocational aim; that is, they come to Northeastern University seeking a technical education either in engineering or in business. However, the specific field

of engineering or business to be followed is not finally determined upon until after one full year of exploration and guidance, as has been explained in a previous chapter.

Vocational adjustment and practical experience in fields of engineering and business are features of the program of the four upperclass years. Students are eligible for this part of the program only after they have been observed and tested and after they have demonstrated a capacity for reasonable progress in the academic requirements of their chosen field. They are given practical work in small or large industrial and engineering organizations which provide certain exploratory experiences in actual life situations. Under the guidance and direction of sympathetic employers and co-ordinators, they acquire valuable practical experience and occupational information which are all important elements in the development of true attitudes, habits and interests in vocational activities. In discussing the importance of attitudes, Burnham says,¹⁶ "The term attitude is not synonymous with the word habit; but every habit.....has

its correlative attitude. Again the word attitude is not synonymous with interest, but a much broader term. Although every interest has its associated attitude, on the other hand many attitudes are not expressed concretely in what are ordinarily called interests, but are largely unconscious." Herein rests the great opportunity for the co-ordinator. He becomes familiar with the habits, attitudes and interests of the students in his charge and can be of inestimable service in guiding the development of well founded and proper attitudes toward work as well as toward study.

The personality development of college students has been a major topic for discussion among personnel officers for several years past. In the midst of campus life, certain very important aspects of this development are well cared for. On the other hand, experiences of employers with college graduates, one or two years out of college, offer ample evidence that the graduate's inability to adapt his personality to the working environment is too frequently the

direct or indirect cause of his failure to measure up to accepted standards. The co-operative job serves as an excellent practical laboratory for the application of the principles of psychology and sociology.

While still engaged in the formal educational process, the undergraduate student rubs elbows with the workman in the shops on everyday working experiences and is more amenable to guidance and adjustment than if he had delayed these experiences until after graduation from college.

The practical and all-important problem of financing the educational program is met in a variety of ways in this modern democratic world. The usual method is through the medium of spare time employment. However, the excessive demand made by this method upon the student's time is frequently detrimental to the quality of his academic work. It is also likely to be conducted at the expense or elimination of the social features of the college program. The co-operative method, however, permits a more orderly and definite scheme of

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planning, budgeting, and acquiring college expenses than does the usual method of summer and spare-time employment. Although spare-time employment methods become a necessity for some Northeastern students, such employment is provided only as an expedient to relieve extreme necessity and is not in any way encouraged.

The co-operative plan, to be effective, must provide during the early years of the program an opportunity for certain students to obtain exploratory experiences. To make this possible, Northeastern has intentionally avoided developing too large a percentage of the so-called training course type of co-operative program. Many of the smaller establishments, because of their size, offer opportunities for a more general type of work, which as a rule are of a more educative nature than are similar jobs in larger organizations. The training course type of program, samples of which have been outlined in a previous chapter, must of necessity be almost entirely restricted to

the larger type of industrial organization.

Because of the very definite distinction between the various types of exploratory jobs and practical experiences to be met by students of the different curricula, the factual survey which follows has been made giving the data for each curriculum independently rather than for the student body as a whole. What is said in the following description of one group of charts, however, is applicable to each group and therefore will not be duplicated. Table VII shows the relative enrolment of students in each curriculum. The civil engineering group being about average in numbers enrolled serves as a satisfactory illustration of all of the engineering curricula.

A study of the firms employing our civil engineering students indicates that the fields of work can be classified under the divisions of general engineering and surveying, drafting room, construction engineering, railroad engineering, municipal engineering,

and state and county engineering. As shown in Table VIII, 43 or 72% of the 60 firms employing civil engineering students can be classified under the division of general engineering and surveying firms. Of the civil engineering students employed at co-operative work 152 or 70% obtain experiences in this field of surveying and general engineering. Table IX shows the actual experiences obtainable by the students of these various divisions under which the civil engineering jobs are classified. To illustrate, firms classified in the division of general engineering and surveying employ students as rodmen, chainmen, transitmen, clearing underbrush and obstruction, cutting stakes, inspecting of construction projects, computing, blue printing, drafting, tracing and care of engineering equipment, or, in other words practically all of the experiences to be met in this type of organization except, of course, executive authority. From these two tables and the chart immediately following showing the distribution of industries employing civil engineering students and the distribution of civil

engineering students by industries, it is evident that all students obtain a fairly general apprenticeship experience in the field of civil engineering regardless of the specific division of work in which they may be employed. Examination of the several groups of tables and charts which follow the civil engineering group will show a similar analysis for mechanical, electrical, chemical, industrial engineering, and business administration students.

Enrollment of Co-operative Students,
January 1931

| | <u>Civils</u> | <u>Mech.</u> | <u>Elec.</u> | <u>Chem.</u> | <u>Indus.</u> | <u>Bus.Admin.</u> | <u>Totals</u> |
|------------|---------------|--------------|--------------|--------------|---------------|-------------------|---------------|
| Seniors | 74 | 58 | 80 | 32 | 11 | 49 | 304 |
| Juniors | 79 | 66 | 111 | 50 | 22 | 72 | 400 |
| Sophomores | 79 | 77 | 106 | 89 | 37 | 80 | 468 |
| Totals | 232 | 201 | 297 | 171 | 70 | 201 | 1172 |

TABLE VII

CIVIL ENGINEERING FIRMS

Current Number Co-operating - 60

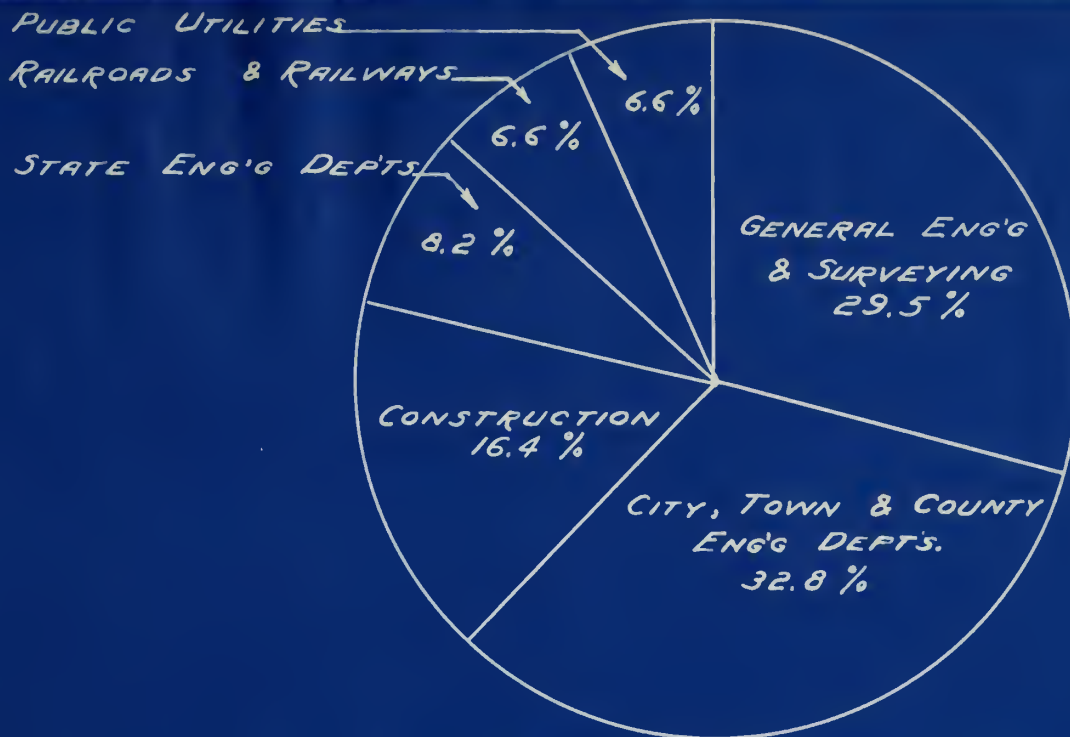
| Classification of Departments | No. of Depts. | Per Cent of Firms | No. of Students | Per Cent of Students |
|--|------------------|----------------------|--------------------|-------------------------|
| General Surveying | 43 | 72 | 152 | 70 |
| Drafting Room | 50 | 83 | 177 | 82 |
| Construction Engineering | 21 | 35 | 97 | 45 |
| Railroad Engineering | 4 | 7 | 20 | 9 |
| Municipal Engineering | 20 | 33 | 60 | 28 |
| State and County Highway Engineering | 7 | 9 | 28 | 13 |

TABLE VIII

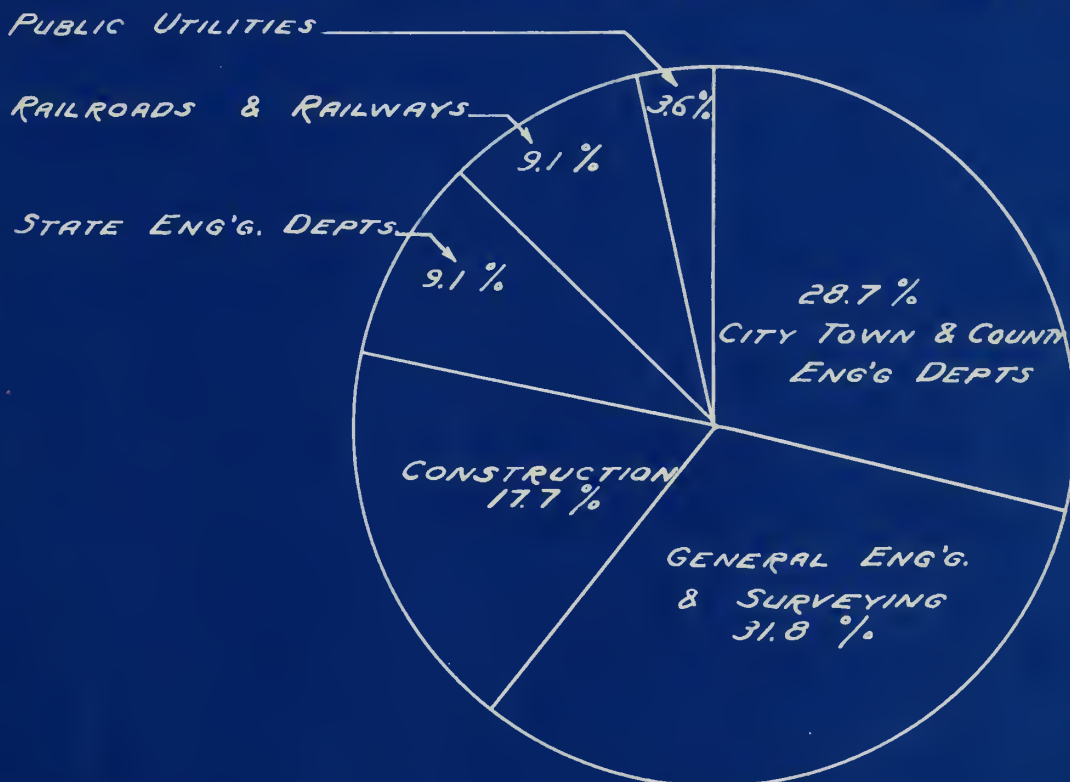
CLASSIFICATION OF CIVIL ENGINEERING JOBS

| <u>Departments</u> | <u>Jobs</u> |
|--------------------------------------|---|
| General Surveying | Rodman, chainman, transitman, clearing, inspecting, computing, drafting, tracing, care of equipment, cutting stakes, blue printing. |
| Drafting Room | Drafting, tracing, detailing, design, blue printing, computing, checking. |
| Construction Engineering | Rodman, transitman, inspection, general helpers, time checking, time and cost keeping, checking. |
| Railroad Engineering | Rodman, chainman, drafting, inspection, computing, checking. |
| Municipal Engineering | Rodman, chainman, transitman, tracing, drafting, designing, computing, checking, blue printing, inspection, time and cost keeping. |
| State and County Highway Engineering | Rodman, transitman, tracing, detailing, drafting, computing, checking, inspection, time and cost keeping. |

TABLE IX



DISTRIBUTION OF INDUSTRIES EMPLOYING CIVIL ENGINEERING STUDENTS



DISTRIBUTION OF CIVIL STUDENTS BY INDUSTRIES

CLASSIFICATION OF BUSINESS ADMINISTRATION JOBS

| <u>Departments</u> | <u>Jobs</u> |
|----------------------------|---|
| Bookkeeping and Accounting | Keeping books, auditing, preparing tax returns. |
| Merchandizing | Stock and sales clerking, messenger, adjustments, personal service work, shipping, receiving, preparing sales promotion data, floor walking, inventory, checking and control, window display, soliciting, preparing advertising data. |
| Banking | Messenger, check telling, mail clerk, coupon cutting, statistical studies, general office work, bookkeeping, auditing. |
| Distribution | Sales, order checking, receiving, sorting, distributing, special studies, buying, shipping, inventory, checking and control, typing. |
| Manufacturing | Operating, assembly, bench work, care of equipment, inspecting, receiving, shipping, messenger, cost keeping, production control, general office work, estimating, typing. |

TABLE X

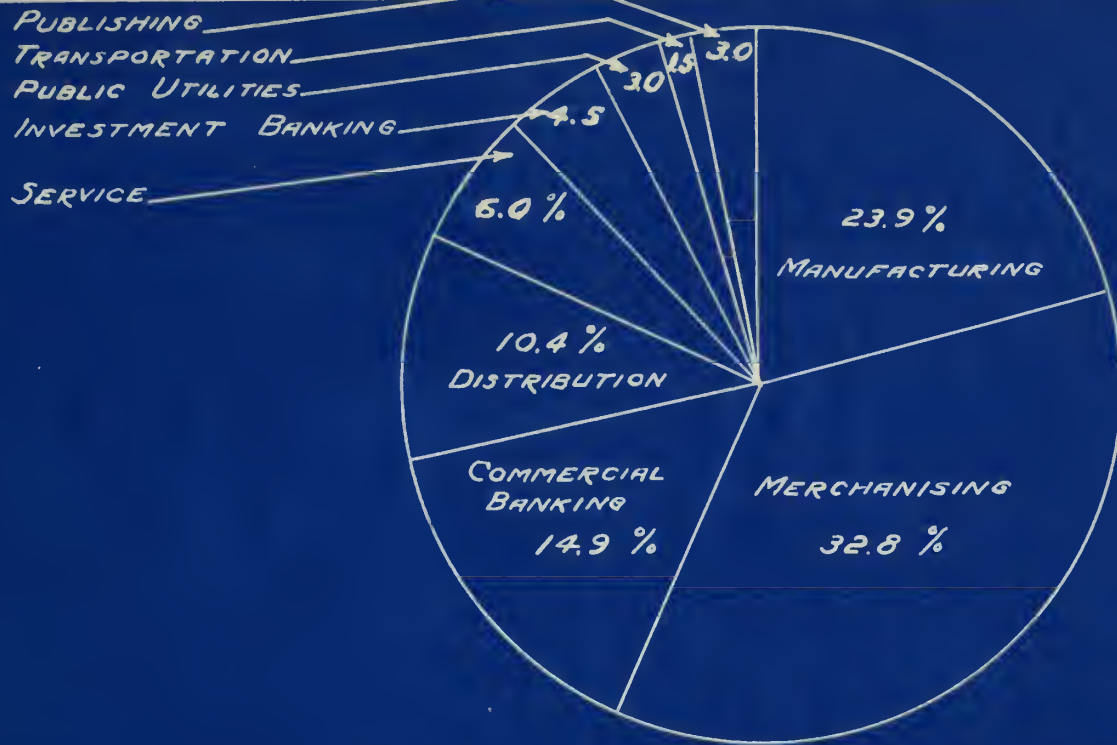
BUSINESS ADMINISTRATION FIRMS

Current Number Co-operating - 67

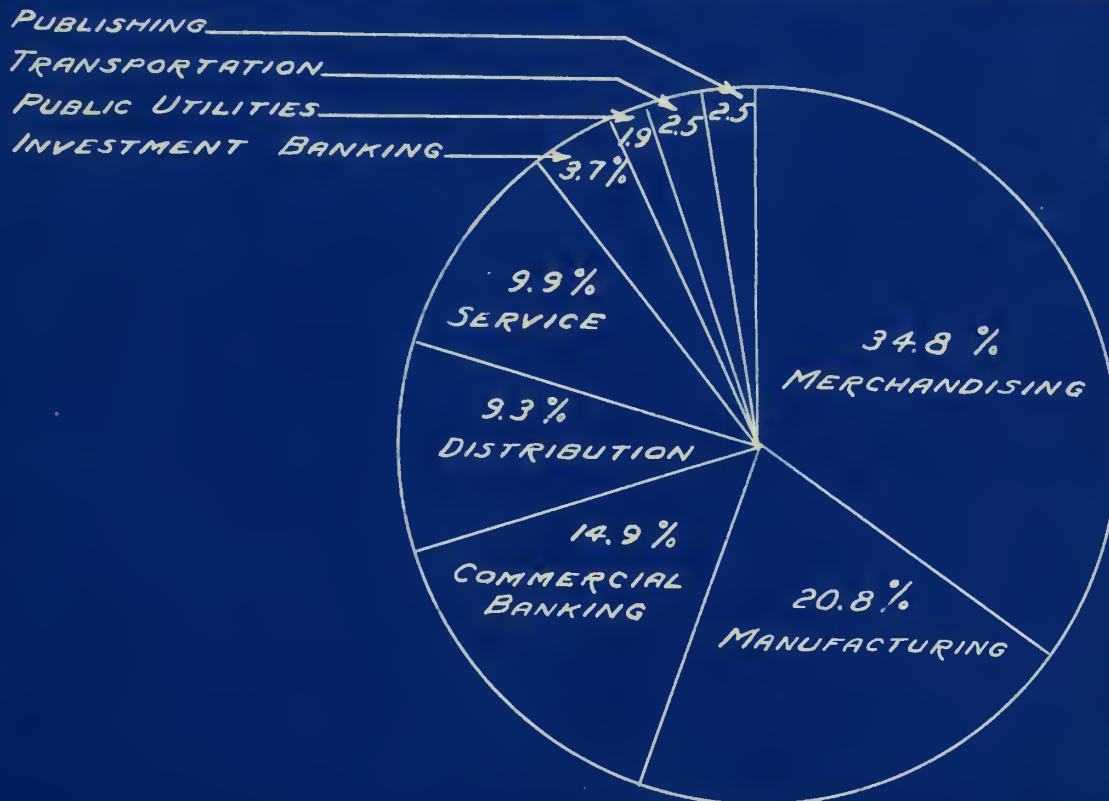
| Classification of Departments | No. of Depts. | Per Cent of Firms | No. of Students | Per Cent of S Students |
|--|------------------|----------------------|--------------------|---------------------------|
| Bookkeeping and Accounting | 5 | 7.4 | 6 | 3.7 |
| Merchandizing | 23 | 34.3 | 59 | 36.6 |
| Banking, Commercial and Investment | 13 | 19.4 | 26 | 16.2 |
| Distribution | 21 | 31.3 | 55 | 34.2 |
| Manufacturing | 20 | 29.8 | 41 | 25.4 |

TABLE XI





DISTRIBUTION OF INDUSTRIES EMPLOYING BUSINESS ADMINISTRATION STUDENTS



DISTRIBUTION OF BUSINESS STUDENTS BY INDUSTRIES

CLASSIFICATION OF INDUSTRIAL ENGINEERING JOBS

| <u>Departments</u> | <u>Jobs</u> |
|--|--|
| Shop Practices | Operating, bench work, assembly, shipping, inspection, messenger work, pattern making, molding, setting up. |
| Production Control | Obtaining, recording and charting of statistical data, preparation and operation of planning and scheduling charts, production follow-up, shipping, cost and record keeping, checking, inspection. |
| Drafting | Tracing, drafting, detailing, designing, blue printing, computing, checking. |
| Testing and Construction Engineering and Development | Testing, data taking, setting up apparatus, inspection, checking, laying out, computing, erecting, assembling, operating, care of instruments. |
| Office Practices | Clerical work, mail clerk, messenger, preparation of statistics, sales data and records. |

TABLE XII

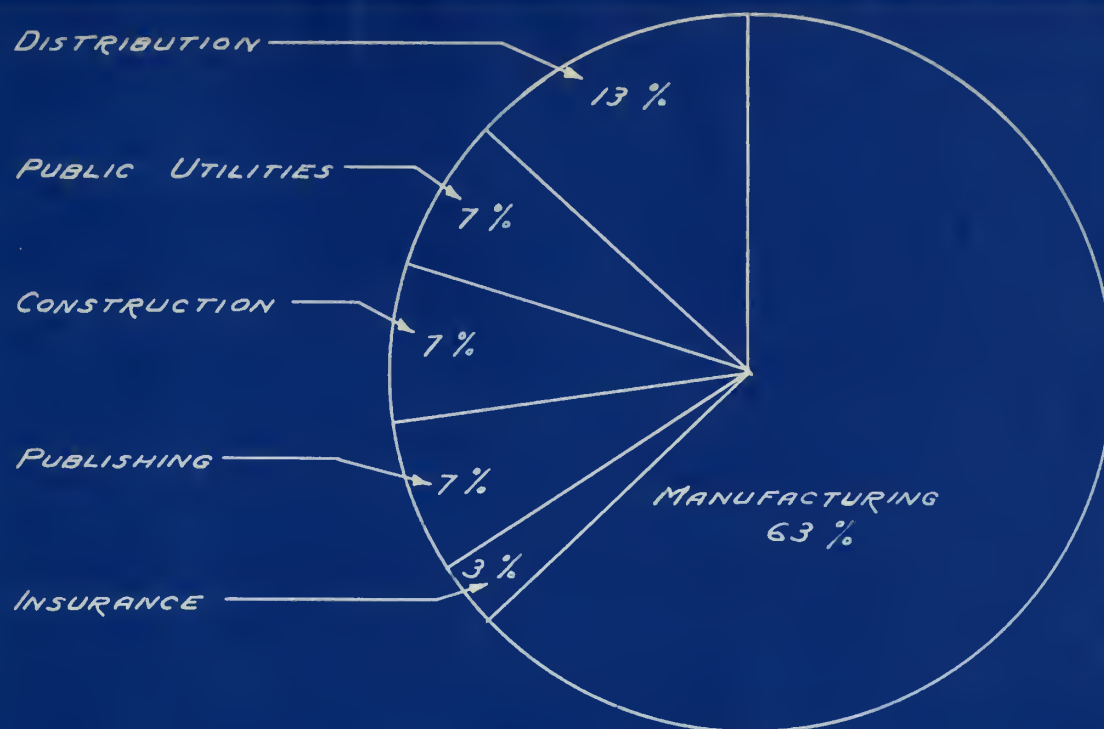
INDUSTRIAL ENGINEERING FIRMS

Current Number Co-operating - 29

| Classification of Departments | No. of Depts. | Per Cent of Firms | No. of Students | Per Cent of Students |
|---|------------------|----------------------|--------------------|-------------------------|
| Shop Practices | 9 | 31 | 13 | 28 |
| Production Control | 8 | 28 | 14 | 30 |
| Drafting Room | 10 | 35 | 19 | 41 |
| Testing and Construction Engineering and Development | 8 | 28 | 11 | 23 |
| Office Practices | 4 | 14 | 6 | 15 |

TABLE XIII





*DISTRIBUTION OF INDUSTRIES
EMPLOYING
INDUSTRIAL ENGINEERING STUDENTS*



*DISTRIBUTION OF INDUSTRIAL STUDENTS
BY
INDUSTRIES*

CLASSIFICATION OF CHEMICAL ENGINEERING JOBS

| <u>Departments</u> | <u>Jobs</u> |
|---|---|
| Development and Research Laboratory | Setting up and dismantling apparatus, qualitative and quantitative analysis, care of equipment, stocks and supplies, checking, operating, data taking and record keeping. |
| Control Laboratory Practice | Sampling, qualitative and quantitative analysis, care of equipment, stocks and supplies, checking, data taking and record keeping, testing. |
| Shop Practices | Operating, production follow-up, sampling, instruction, maintenance and repair, installations, checking, inspection. |
| Testing | Sampling, operating, setting up and dismantling equipment, inspection, data taking and record keeping, computing. |

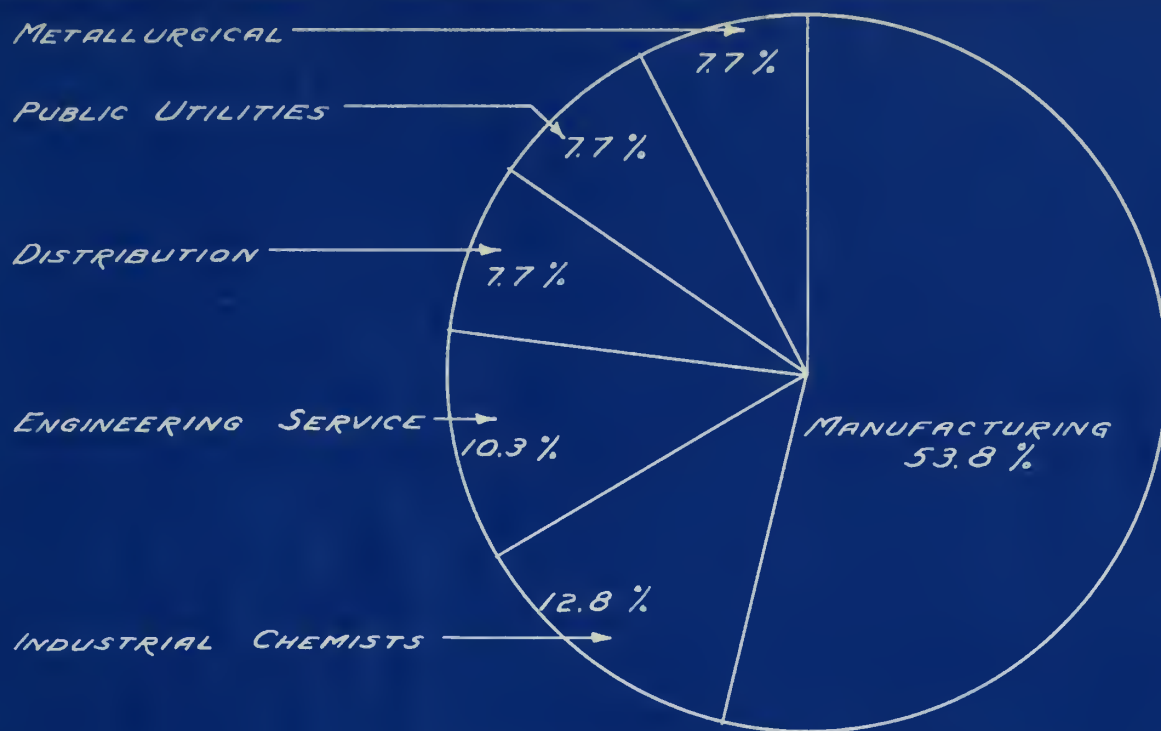
TABLE XIV

CHEMICAL ENGINEERING FIRMS

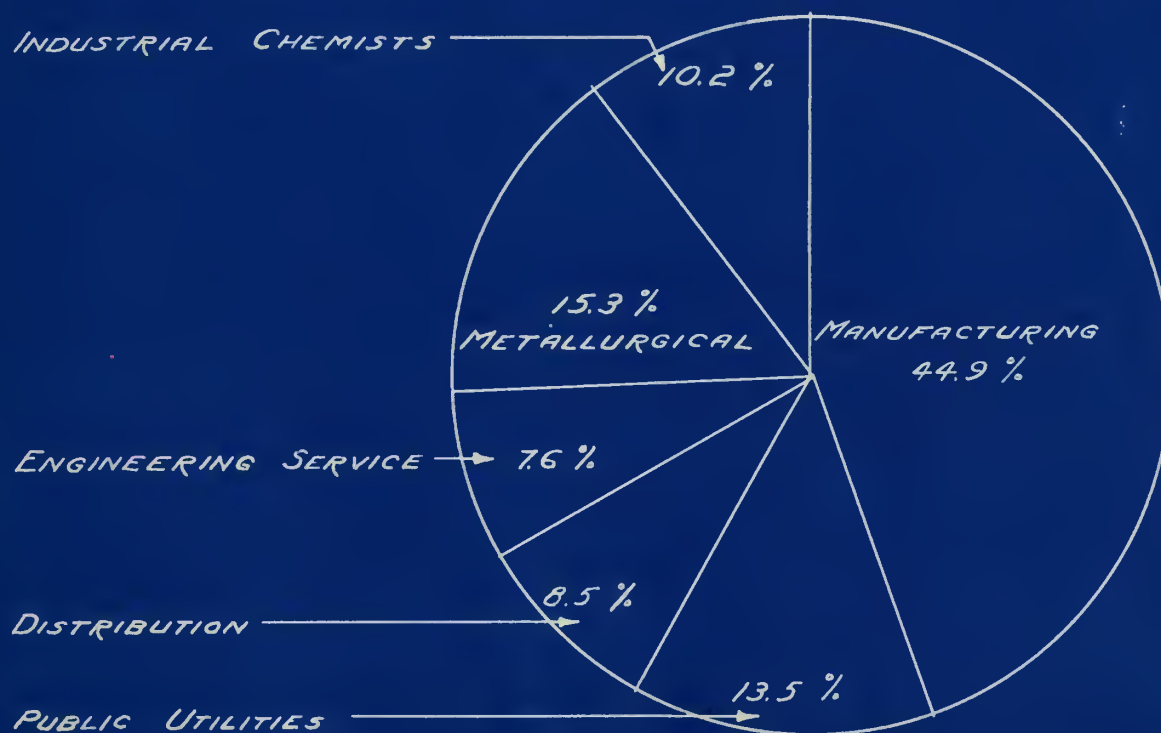
Current Number Co-operating - 37

| Classification of Departments | No. of Depts. | Per Cent of Firms | No. of Students | Per Cent of Students |
|---|------------------|----------------------|--------------------|-------------------------|
| Development and Research Laboratory | 12 | 32 | 36 | 33 |
| Control Laboratory Practice | 26 | 70 | 89 | 82 |
| Shop Practices | 12 | 32 | 53 | 49 |
| Testing | 13 | 35 | 43 | 40 |

TABLE XV



*DISTRIBUTION OF INDUSTRIES
EMPLOYING
CHEMICAL ENGINEERING STUDENTS*



*DISTRIBUTION OF CHEMICAL STUDENTS
BY
INDUSTRIES*

CLASSIFICATION OF ELECTRICAL ENGINEERING JOBS

| <u>Departments</u> | <u>Jobs</u> |
|----------------------------|--|
| Power, Light, and Traction | Low and high voltage testing and standardizing of equipment, maintenance, repair and installation of equipment, overhead and underground construction, maintenance and testing, power house testing, inspection, checking, computing, drafting, tracing, stock keeping, messenger service. |
| Manufacturing | Operating, bench work, assembly, stock keeping, checking, inspection, testing, tracing, detailing, drafting, designing. |
| Maintenance and Service | Dismantling, repairing, assembly, installing, checking, inspection. |
| Construction Engineering | Laying out, assembly, installation, erection, inspection, checking, drafting, tracing, computing, general helper. |
| Testing and Development | Operating, bench work, assembly, checking, testing. |

TABLE XVI

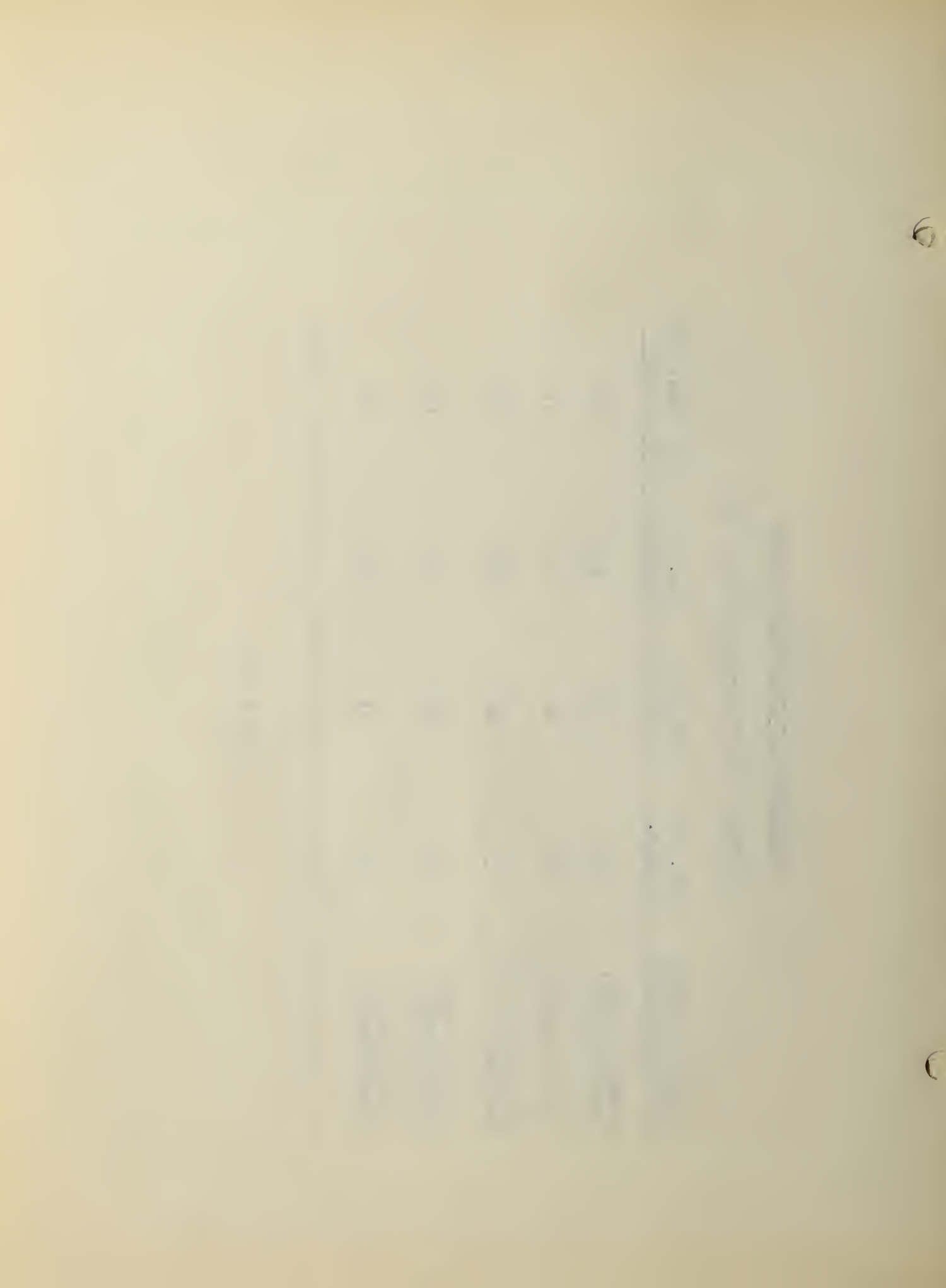


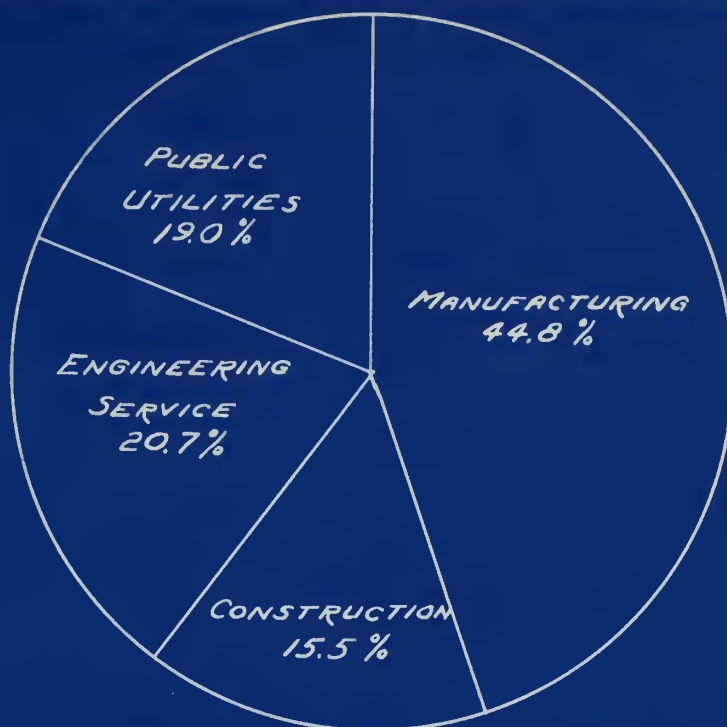
ELECTRICAL ENGINEERING FIRMS

Current Number Co-operating - 56

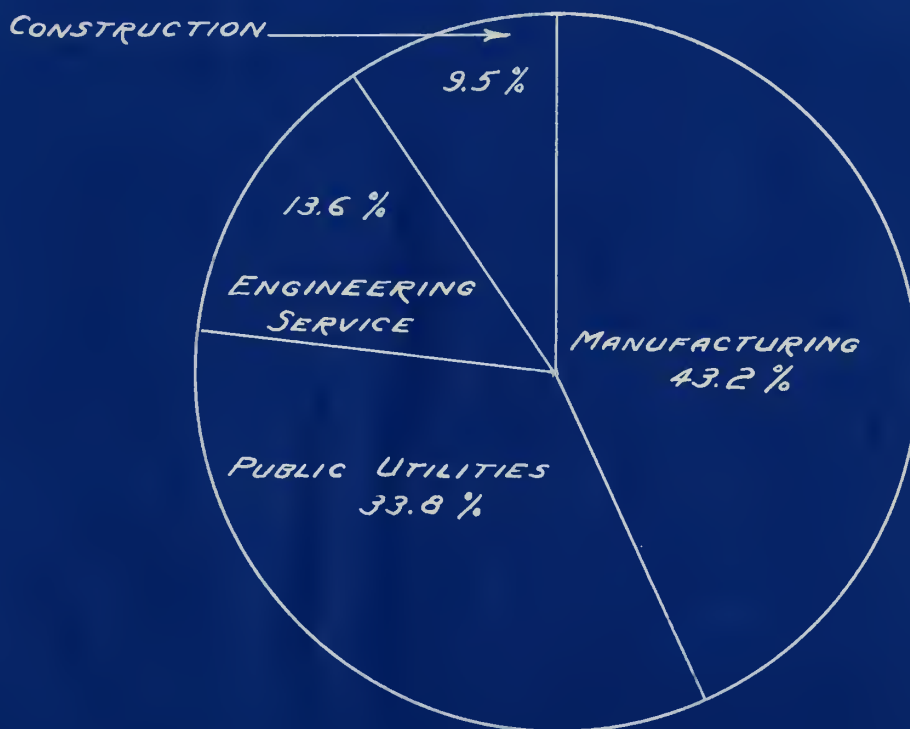
| Classification of Departments | No. of Depts. | Per Cent of Firms | No. of Students | Per Cent of Students |
|----------------------------------|------------------|----------------------|--------------------|-------------------------|
| Power, Light, and Traction | 11 | 20 | 82 | 34 |
| Manufacturing | 29 | 52 | 113 | 47 |
| Maintenance and Service | 12 | 22 | 105 | 43 |
| Construction Engineering | 18 | 32 | 32 | 13 |
| Testing and Development | 32 | 57 | 177 | 73 |

TABLE XVII





*DISTRIBUTION OF INDUSTRIES
EMPLOYING
ELECTRICAL ENGINEERING STUDENTS*



*DISTRIBUTION OF ELECTRICAL STUDENTS
BY
INDUSTRIES*

CLASSIFICATION OF MECHANICAL ENGINEERING JOBS

| <u>Departments</u> | <u>Jobs</u> |
|----------------------------------|--|
| Power House and Manufacturing | Care of instruments, changing of control charts, maintenance of equipment, oiling, operating, bench work, assembly, inspecting, molding, pattern making, shipping, messenger work. |
| Drafting Room | Tracing, detailing, design- ing, computing, checking. |
| Maintenance and Construction | Dismantling, repairing, in- stalling, assembly, check- ing, erecting, inspecting. |
| Testing and Development | Experimenting, testing, operating, machine work, erecting, dismantling, data taking. |

TABLE XVIII

MECHANICAL ENGINEERING FIRMS

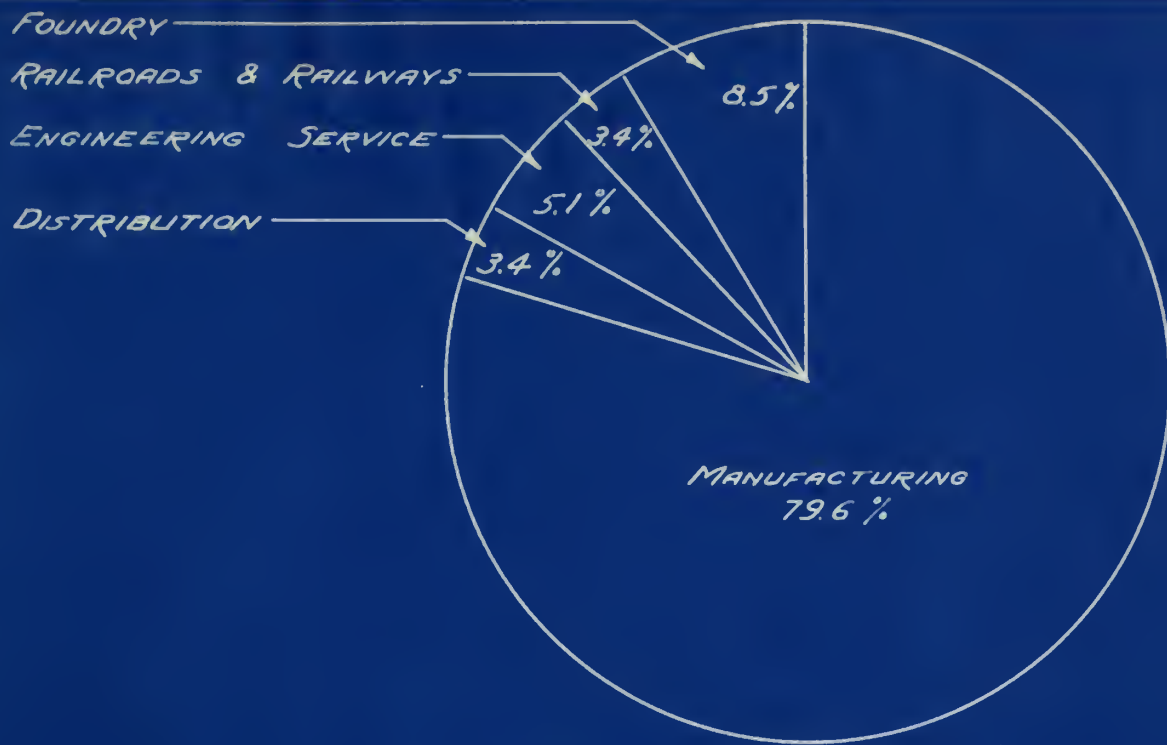
Current Number Co-operating - 59

| <u>Classification of Departments</u> | <u>No. of Depts.</u> | <u>Per Cent of Firms</u> | <u>No. of Students</u> | <u>Per Cent of Students</u> |
|--|--------------------------|------------------------------|----------------------------|---------------------------------|
| Power House and Manufacturing | 44 | 75 | 125 | 72 |
| Drafting Room | 28 | 48 | 93 | 53 |
| Maintenance and Construction | 7 | 13 | 36 | 21 |
| Testing and Development | 13 | 22 | 47 | 27 |

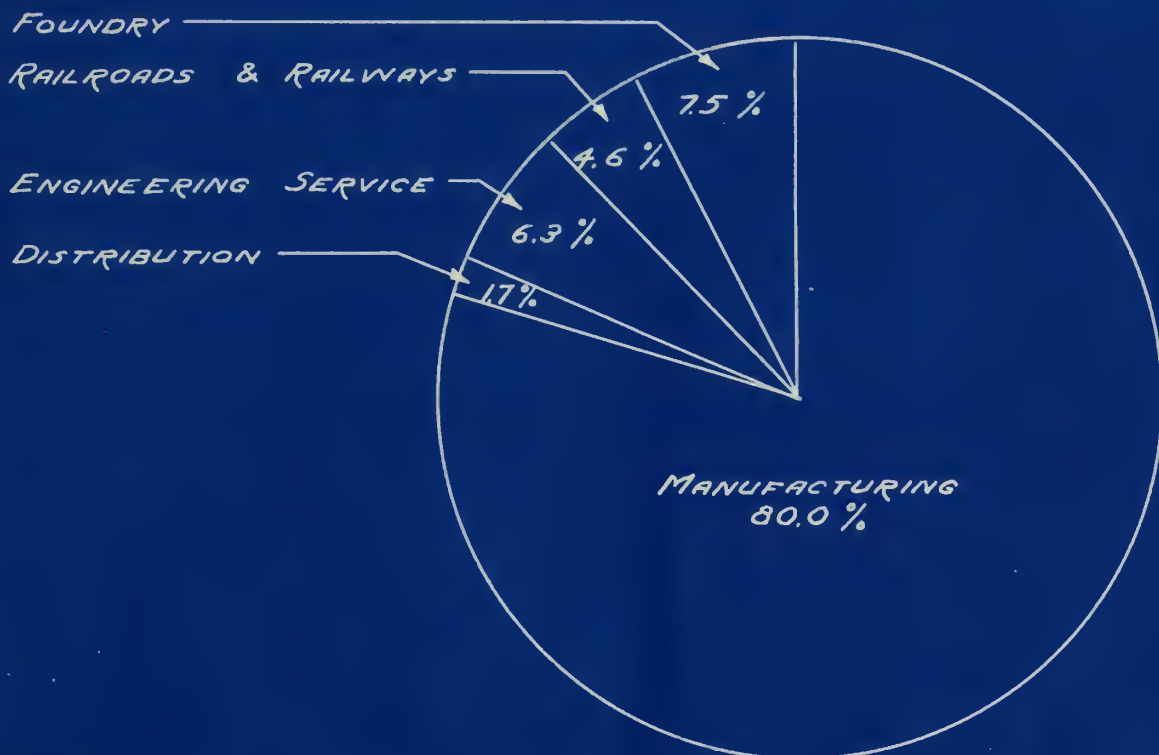
TABLE XIX

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DISTRIBUTION OF INDUSTRIES
EMPLOYING
MECHANICAL ENGINEERING STUDENTS



DISTRIBUTION OF MECHANICAL STUDENTS
BY
INDUSTRIES

Chapter 5

OCCUPATIONAL SURVEY OF ENGINEERING ALUMNI

The survey presented in the previous chapter was restricted to the occupational activities and vocational opportunities of undergraduates only. The efficacy of the program is adequately tested, however, only when the student has passed out from under the supervision of the college and has joined that ever increasing throng of technically trained college graduates, has been faced with the necessity of meeting the competition not so much of his fellow college mates as of graduates of other colleges and of entirely different systems of education, and has been faced with the necessity for meeting the standard of achievement which is being raised higher and higher each year by the ever increasing "competitive bidding" of the larger corporations of the country for the "cream" of graduating classes.

The response of industry to this test is aptly expressed in a letter from the manager of personnel and training of one of these large corporations as follows: "We look with considerable favor upon the objectives and methods of Northeastern University in preparing its students in a very practical way for their subsequent work in industry.

"We have found Northeastern men most readily absorbed, and a point of great importance is that their attitude towards their start in industry is right and they realize that their real value can only be developed by experience. This proper attitude on the part of a young graduate is one which we consider of great importance. We find it in Northeastern men."

The opinions of graduates themselves was solicited through an occupational survey questionnaire sent to the class of 1925 and mentioned more in detail in a subsequent chapter. This particular class was chosen because there had elapsed since their gradua-

tion slightly more than five years and there seems to be a general feeling among employers that if college graduates do not "find themselves" within five years after date of graduation from college, there is little hope that they ever will. Moreover, the authors wanted as a check on other data obtainable through the alumni records the personal opinions of the graduates themselves in relation to the classification of their present occupational activities. The results of this questionnaire are shown in Table XX. It is interesting to observe that only 3% of the returns indicated any definite tendency away from occupational activities for which the men prepared. Of the 12% who are teaching more than half are engaged in engineering college teaching.

A more extensive and comprehensive study of alumni occupational activities was made by means of alumni records which are maintained by a branch of the Department of Co-operative Work. At least once each year every alumnus is followed up and the record of his occupational activities of the past year

Questionnaire
Occupational Survey Class 1925
65 Returns or 46% of Class

| Classification | | Order of Importance | | | |
|----------------|--|---------------------|------|----|---|
| | | 1 | | 2 | 3 |
| | | # | % | # | # |
| I | Consulting | 1 | 1.5 | - | 1 |
| II | Research | 5 | 7.7 | 4 | - |
| III | Design and Application Engineering | 30 | 46.2 | 10 | 1 |
| IV | Commercial | 5 | 7.7 | 2 | - |
| V | Manufacturing | 6 | 9.2 | 1 | - |
| VI | Construction | 6 | 9.2 | 1 | 2 |
| VII | Patent | 2 | 3.1 | - | - |
| VIII | Teaching | 8 | 12.3 | - | - |
| IX | Miscellaneous | 2 | 3.1 | - | - |

TABLE XX

brought up to date. It is from these records that the data which follow have been compiled.

It seemed wise to make this analysis, as was done for undergraduates, in independent groups according to the curriculum pursued rather than to treat the alumni body as a whole. No study was made of the business administration alumni, however, because of the small number of graduates of that school, which graduated its first class in 1926. Moreover, the class of 1931 will be the first class to graduate from the business school which had the privilege of attending college throughout its entire course on the co-operative plan. For these reasons it was felt that a survey of this group at this time would produce no significant results.

In this chapter, as in the previous one, the civil engineering group will be used to illustrate the findings. One set of charts indicates the distribution of the alumni by classes in the various divisions of the particular field of engineering. For instance, in the field of surveying and general engine-

ering there are 13% of the class of 1921, 15% of the class of 1922, 4% of the class of 1924 etc. up to the class of 1929 of which 27% are engaged in this particular field. Then follow similar charts showing the distribution by classes in railroad, highway, municipal and county, construction engineering, teaching, structural, and miscellaneous.

The second set of charts shown by classes the distribution of alumni according to this same classification of the field of engineering. By way of illustration, it will be observed that of the class of 1923 4% are engaged in surveying and general engineering, 16% in railroad engineering, 21% in highway engineering etc. Inspection of these charts indicates a tendency away from surveying and general engineering and towards construction as the number of years after graduation increases. In more recent years the percentages of the classes engaged in railroad and in highway engineering seems to have increased. It is natural that the recently graduated classes should not be strongly represented in the structural and consulting field.

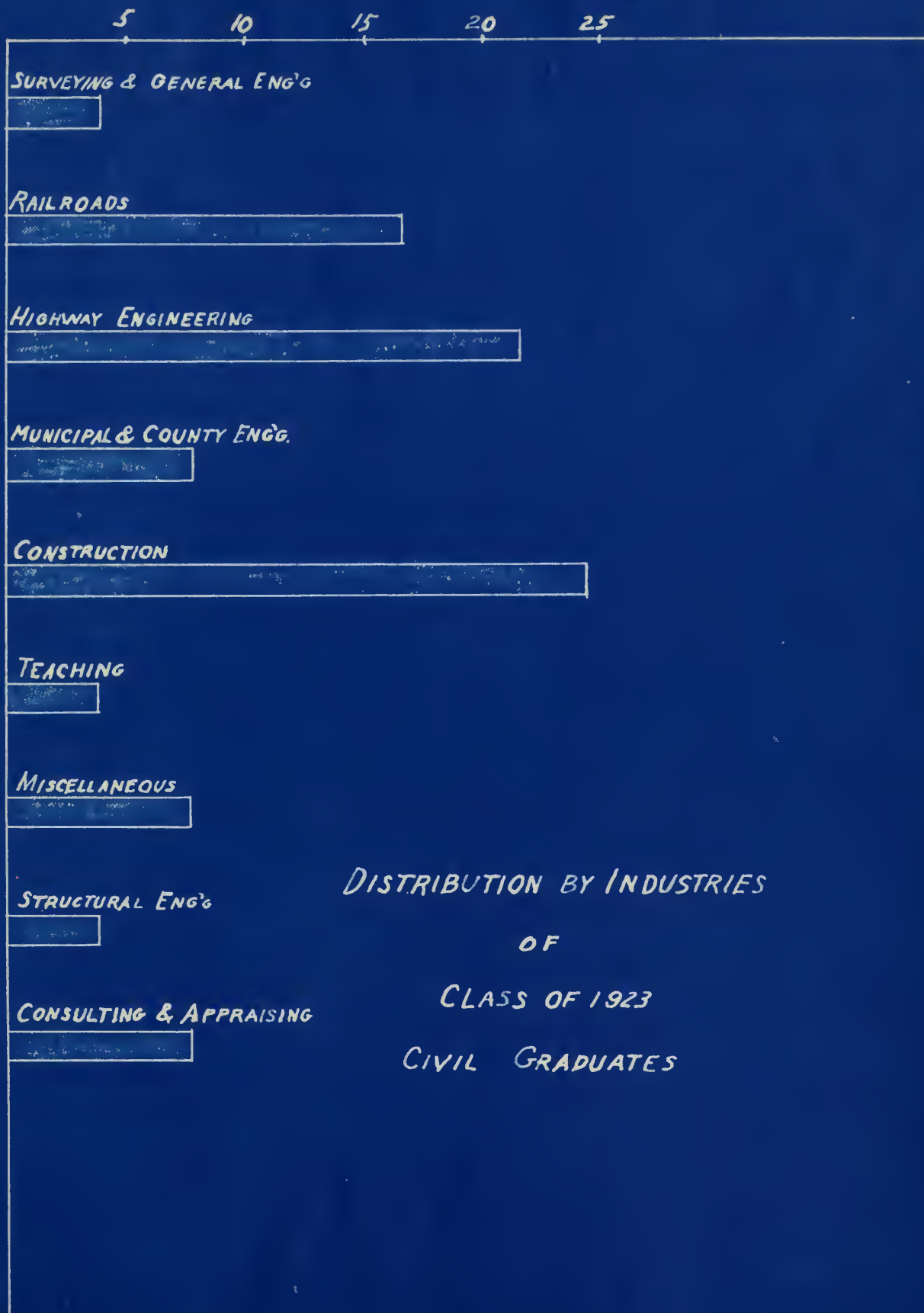
The charts of the mechanical graduates indicate no particular trend, but in passing it should be pointed out that in the mechanical engineering field advancement ordinarily comes within the division of the field rather than from one division to another.

Of the electrical group there is a definite trend toward teaching, commercial activity, and patent work with increasing years after graduation and a tendency away from manufacturing. The fields of manufacturing, public utilities, construction, and communications seem to have absorbed the majority of the recent graduates.

The one significant trend of the chemical graduates is apparently toward industrial and research chemistry with increasing years out of college. Of this group, as of the mechanical, the vast majority are apparently finding their opportunities in the field of manufacturing where the importance of chemical control and research is being considered increasingly more significant to the welfare and progress of up-to-date establishments.

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HIGHWAY ENGINEERING

MUNICIPAL & COUNTY ENG'G

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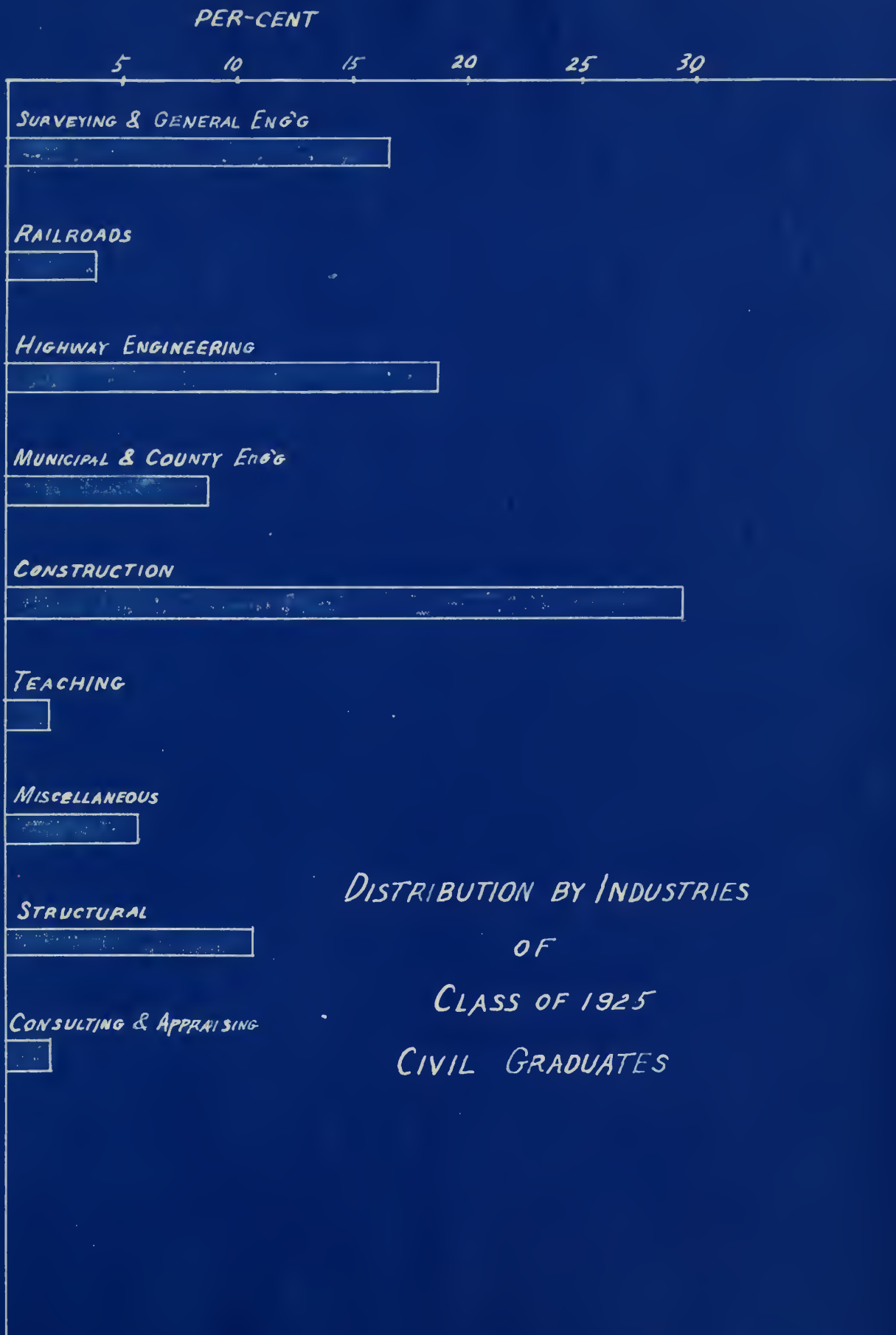
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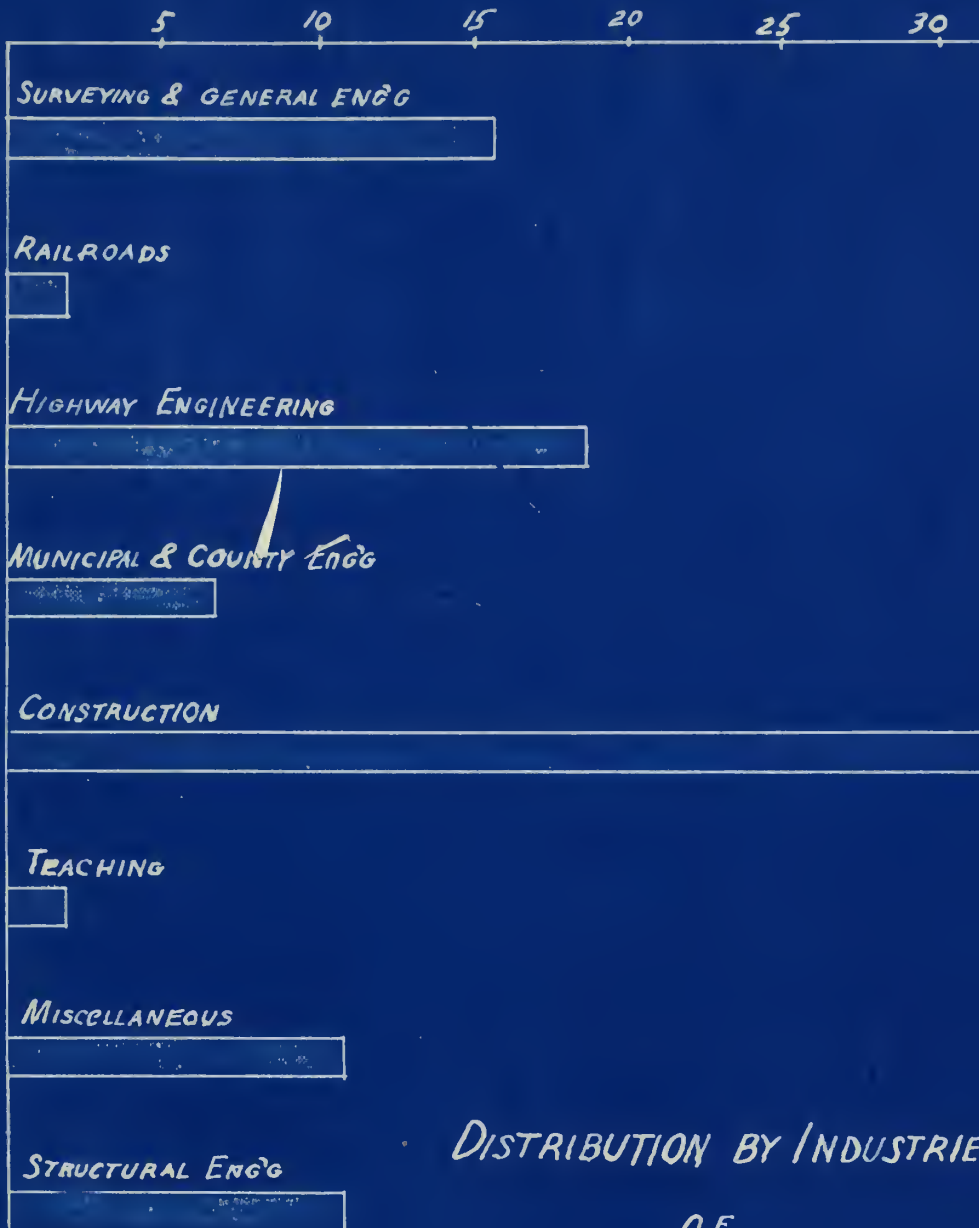
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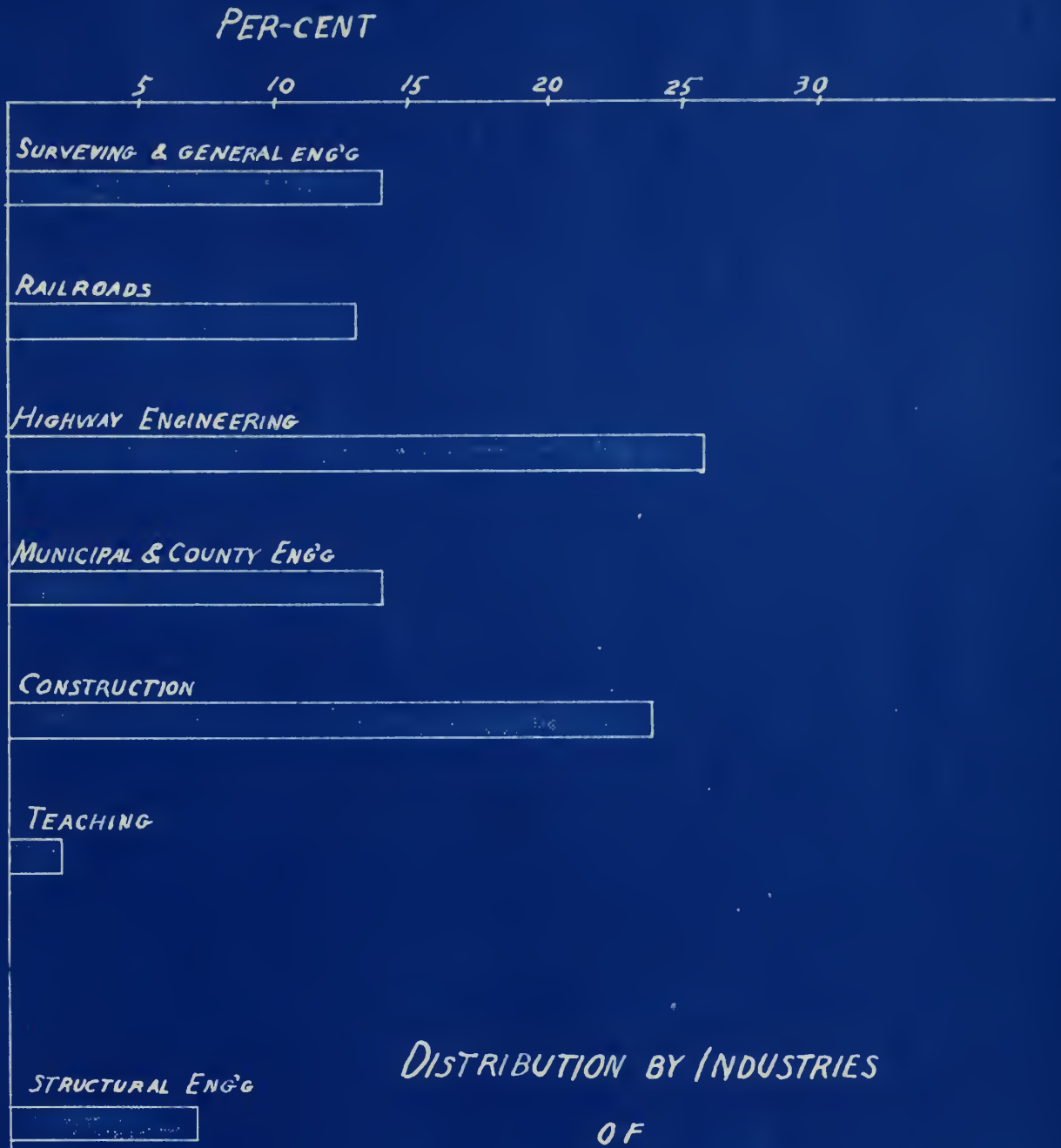
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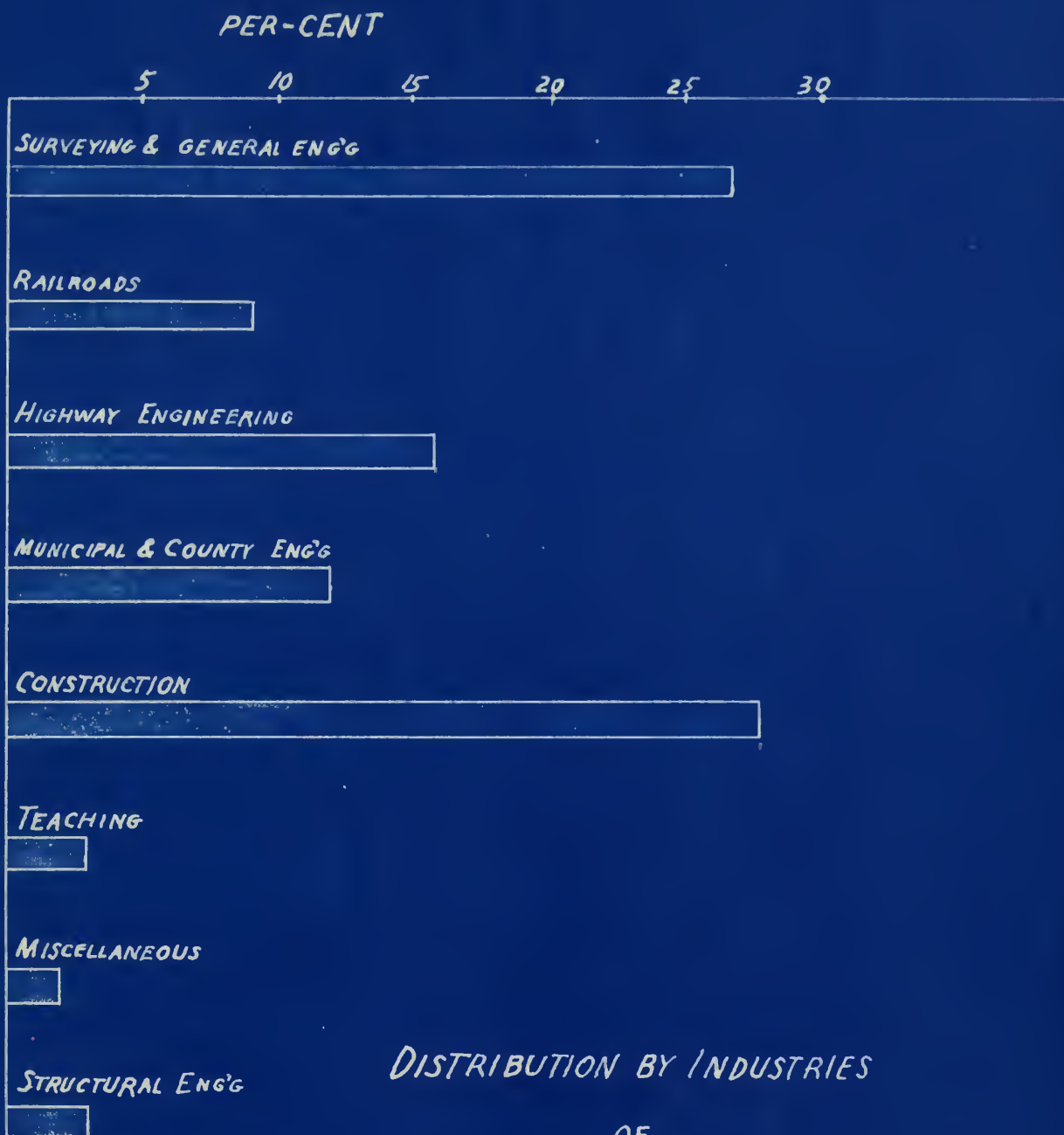
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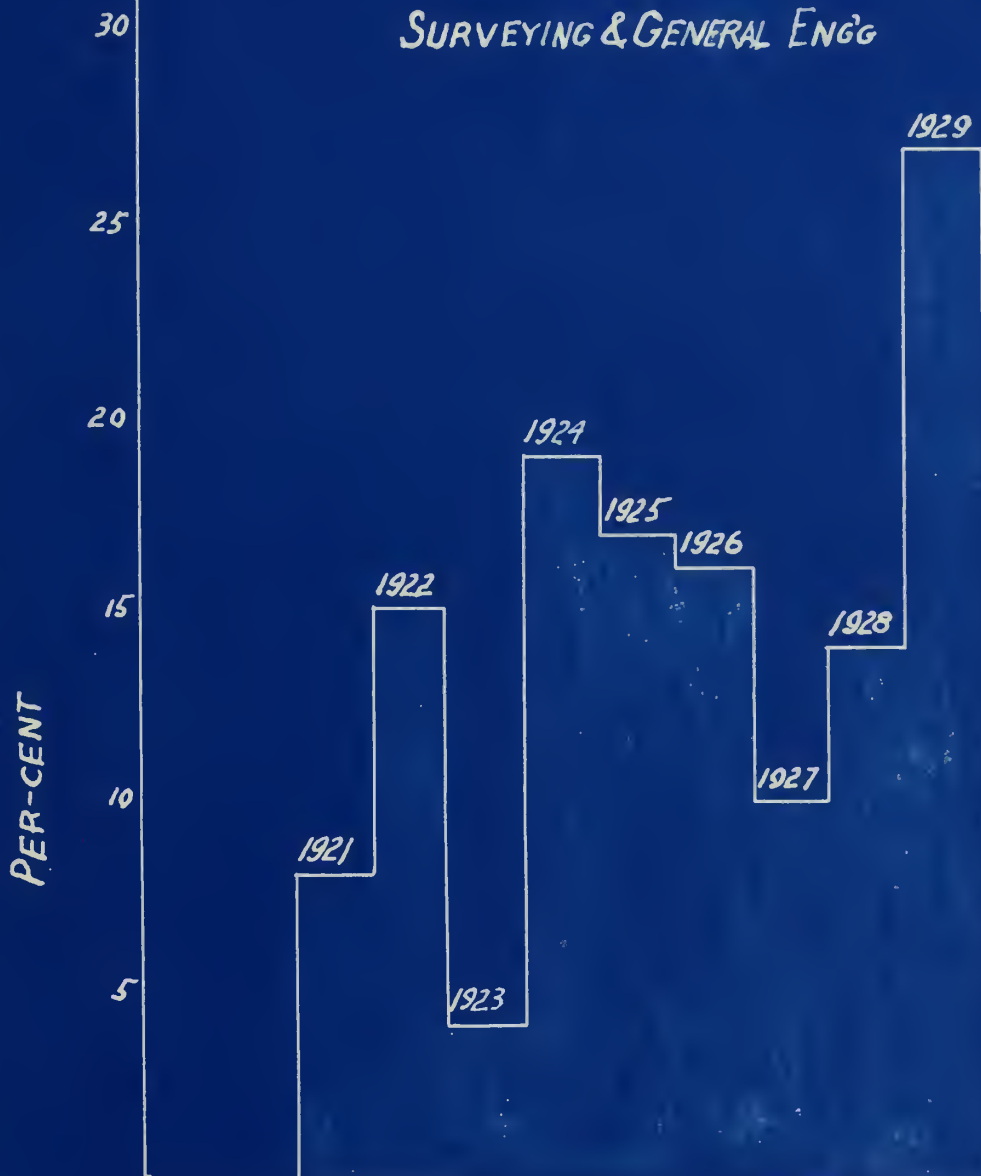


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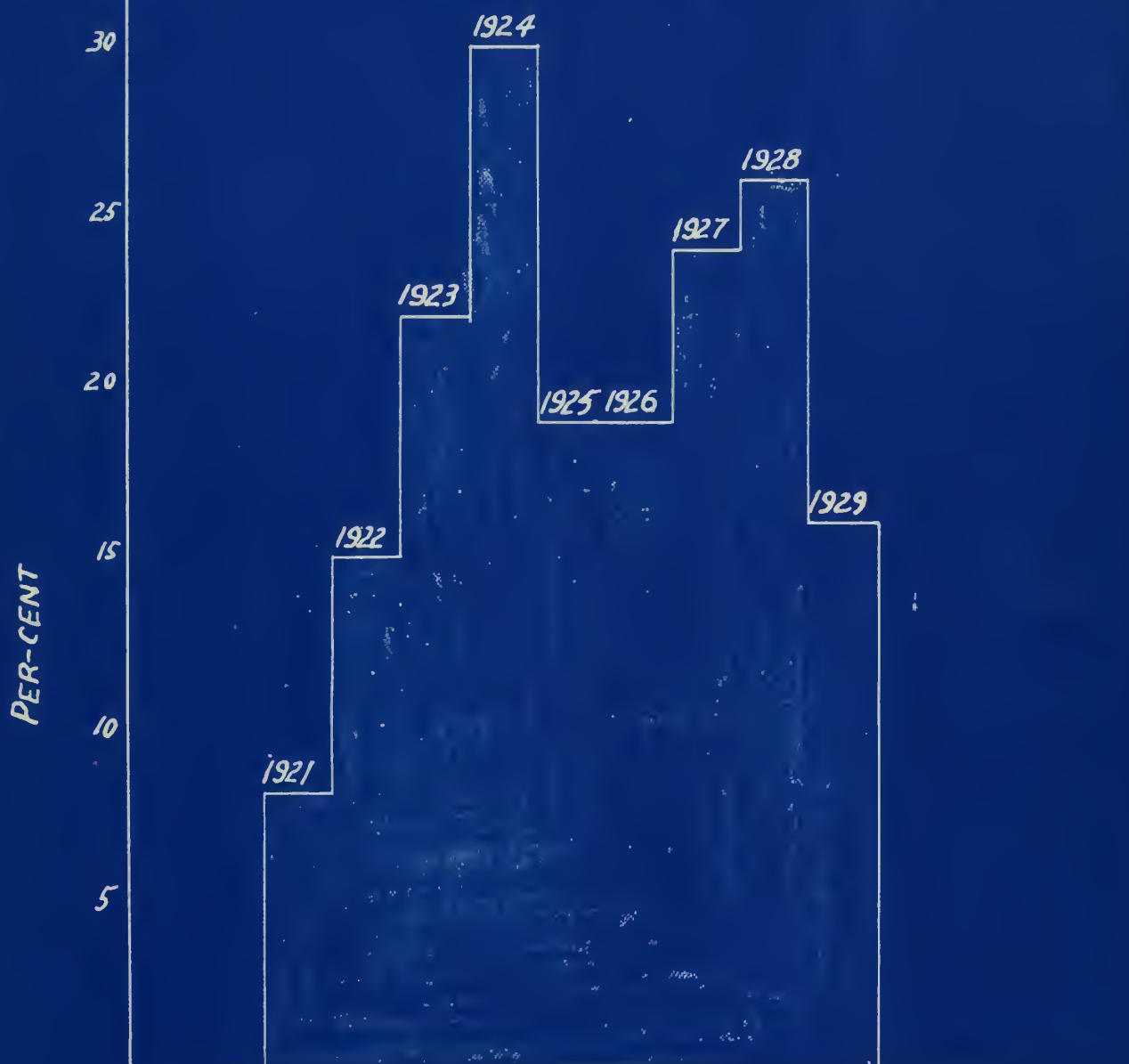
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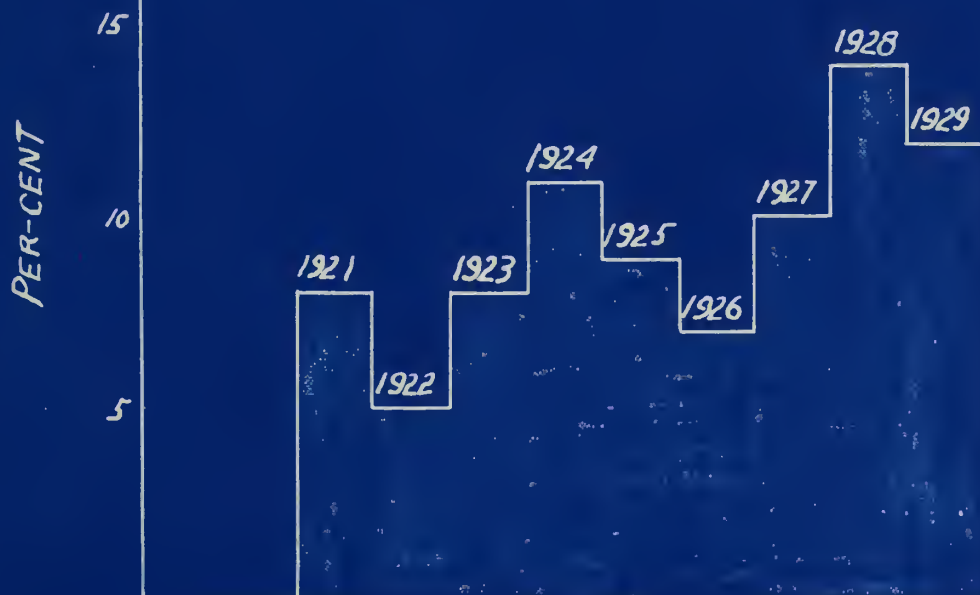


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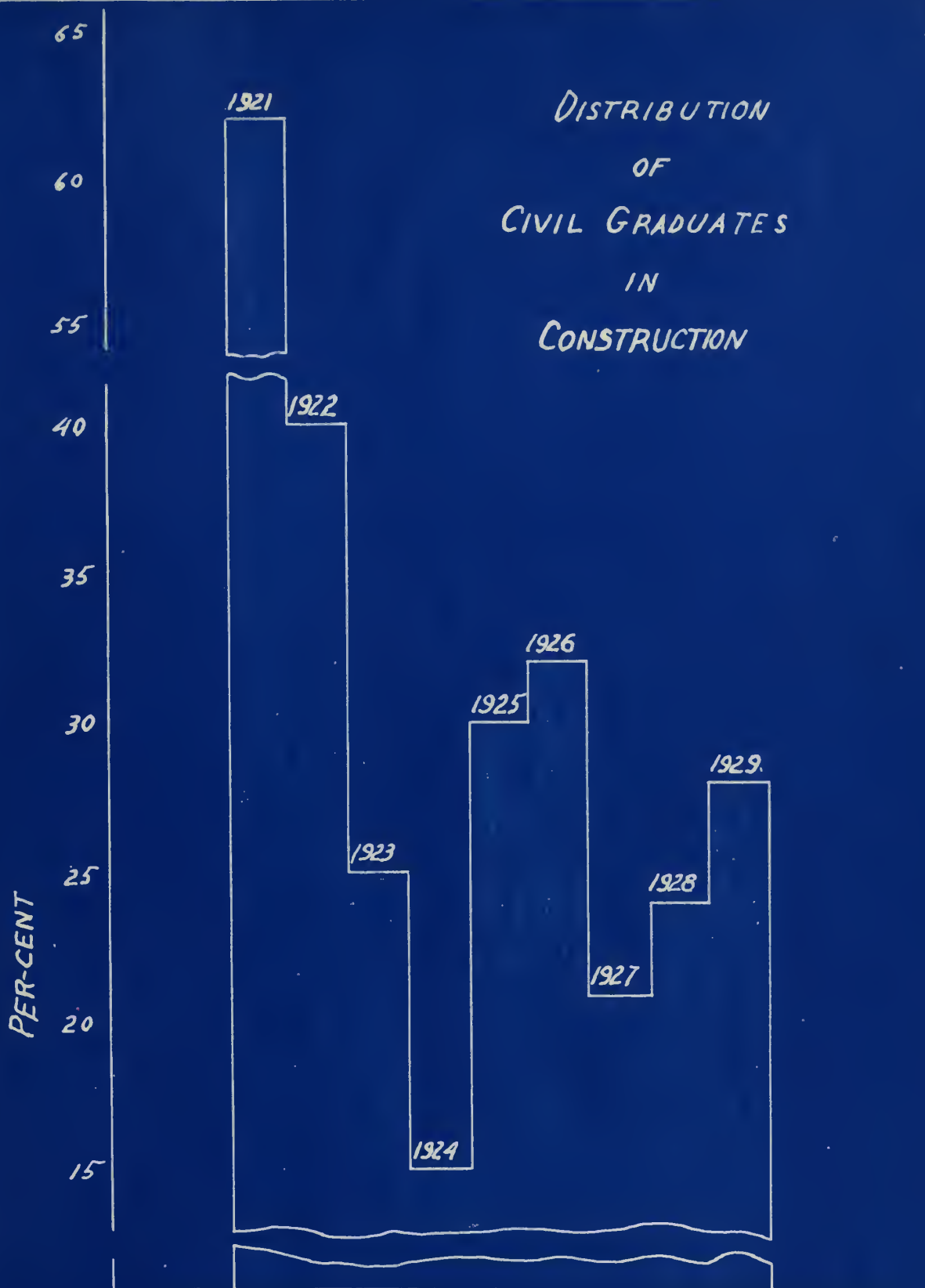


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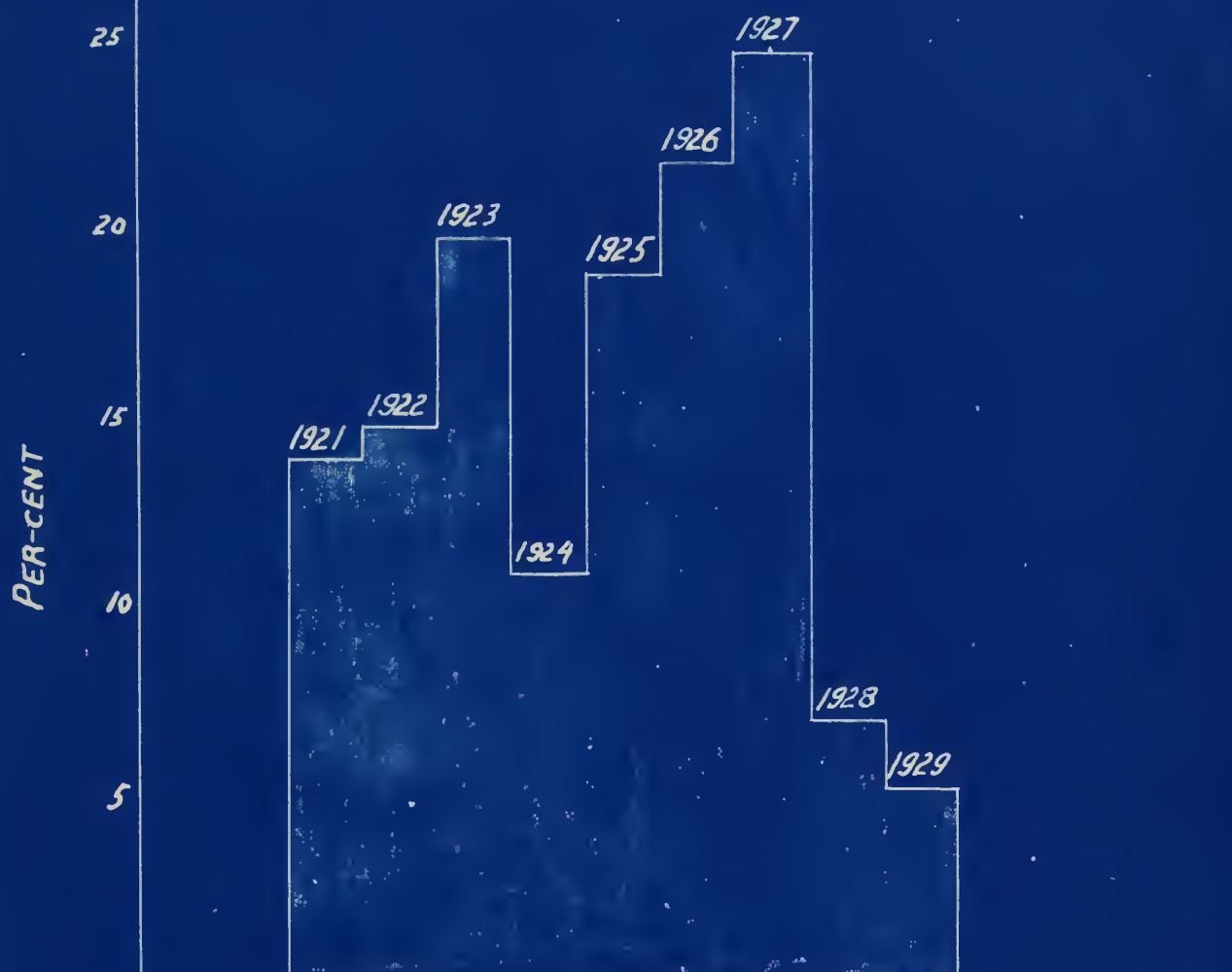
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IN
STRUCTURAL, CONSULTING
AND MISCELLANEOUS



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CONSTRUCTION & INSTALLATION

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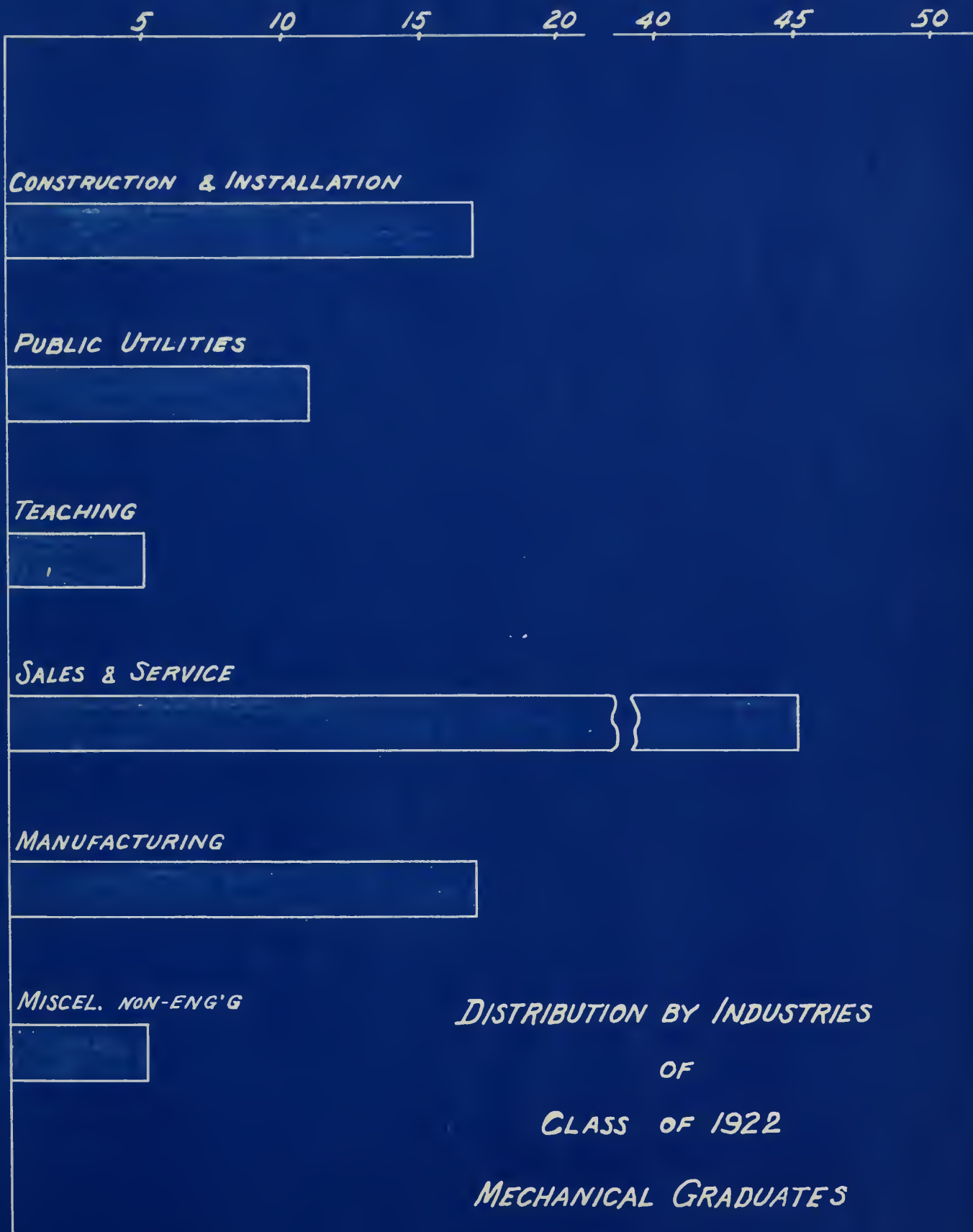
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SALES & SERVICE

MANUFACTURING

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DISTRIBUTION BY INDUSTRIES
OF
CLASS OF 1922
MECHANICAL GRADUATES

PERCENT

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CONSTRUCTION & INSTALLATION

PUBLIC UTILITIES

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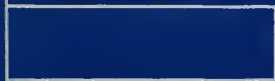
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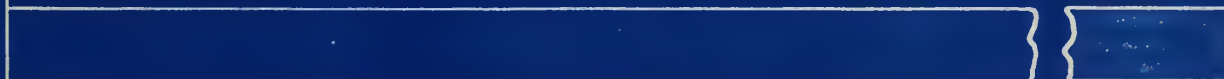
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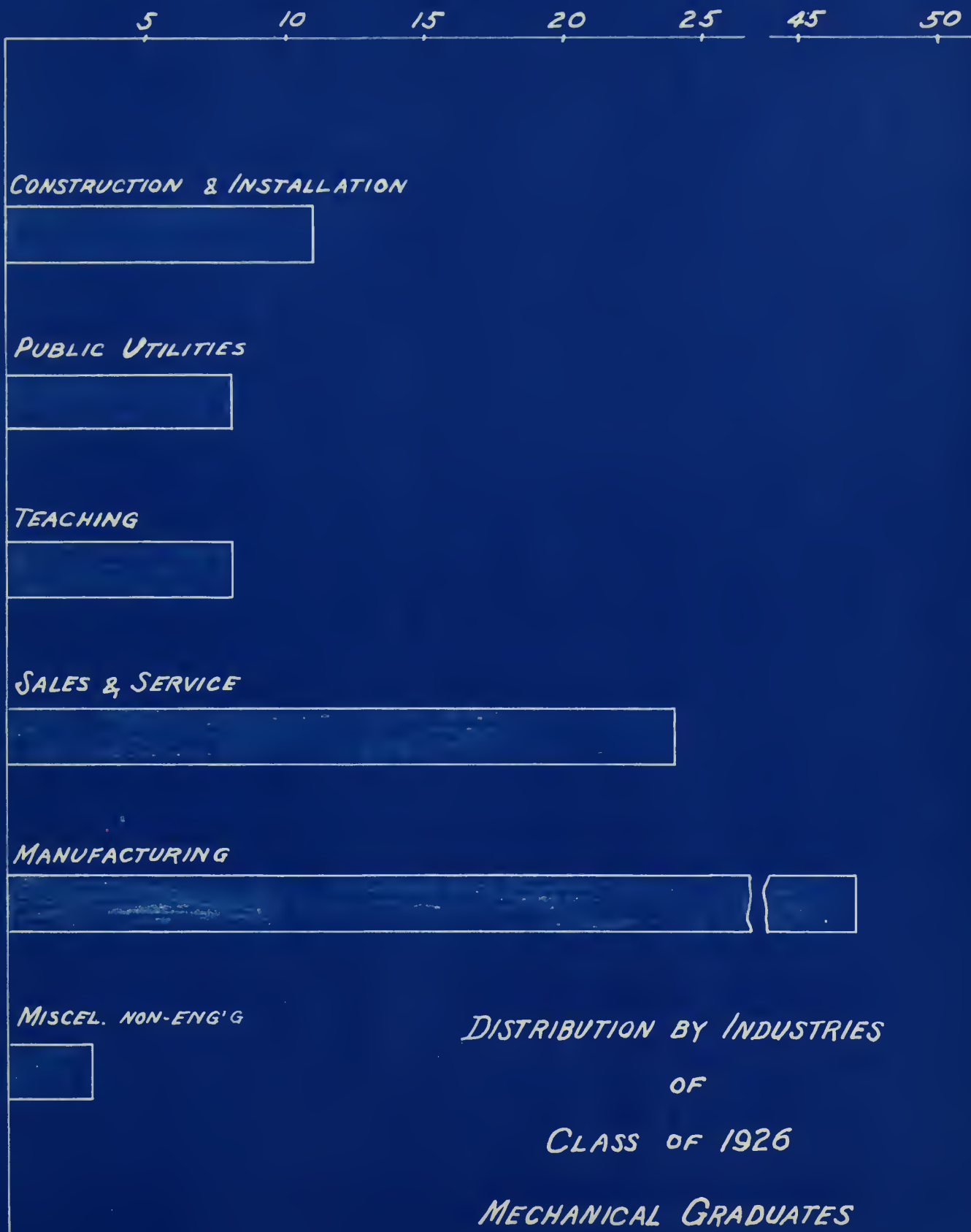


MISCEL. NON-ENG'G



DISTRIBUTION BY INDUSTRIES
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*DISTRIBUTION BY INDUSTRIES
OF
CLASS OF 1926
MECHANICAL GRADUATES*



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CONSTRUCTION & INSTALLATION



PUBLIC UTILITIES



TEACHING



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CONSTRUCTION & INSTALLATION



PUBLIC UTILITIES



TEACHING



SALES & SERVICE



MANUFACTURING



MISCEL. NON-ENG'G



DISTRIBUTION BY INDUSTRIES

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MECHANICAL GRADUATES

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CONSTRUCTION & INSTALLATION



PUBLIC UTILITIES



TEACHING



SALES & SERVICE



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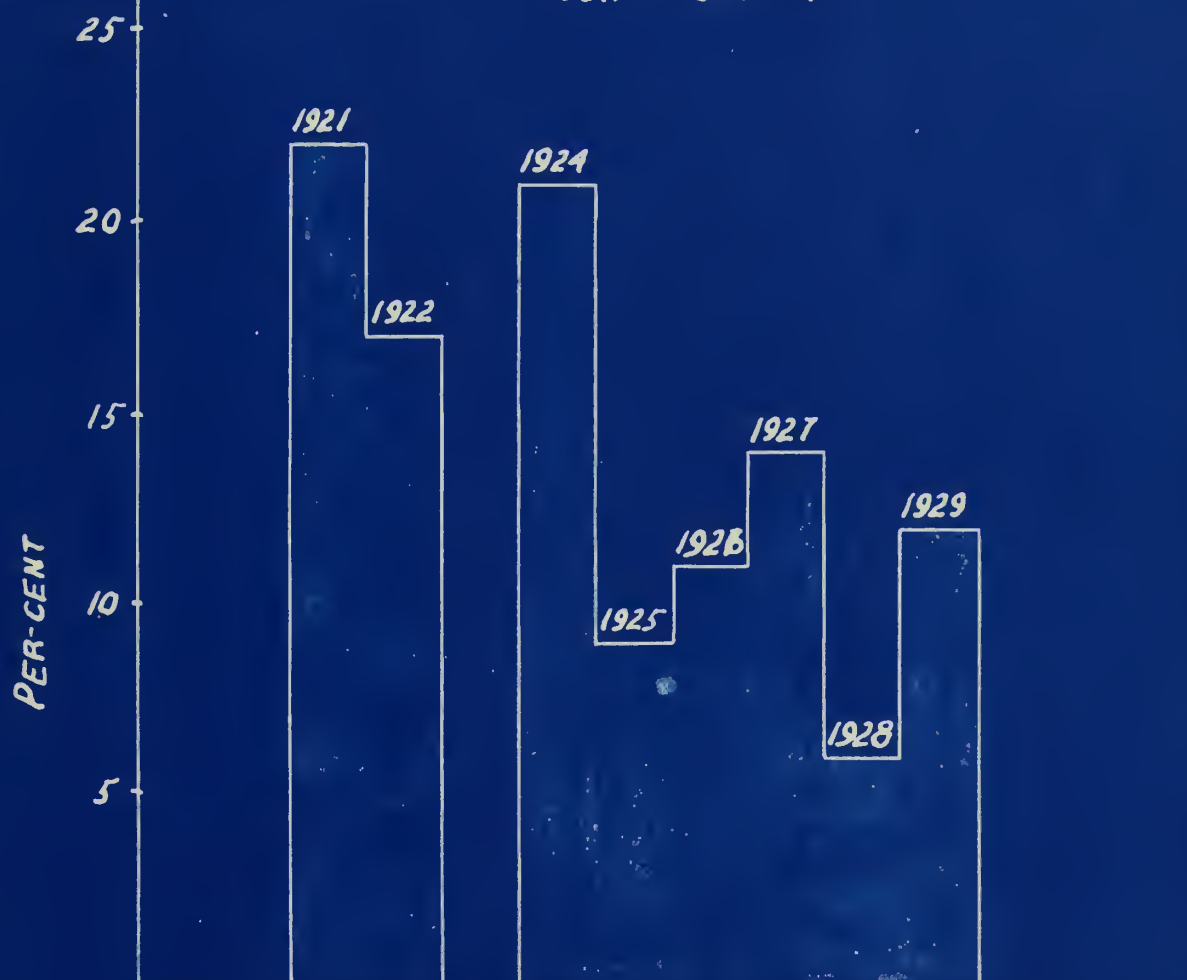


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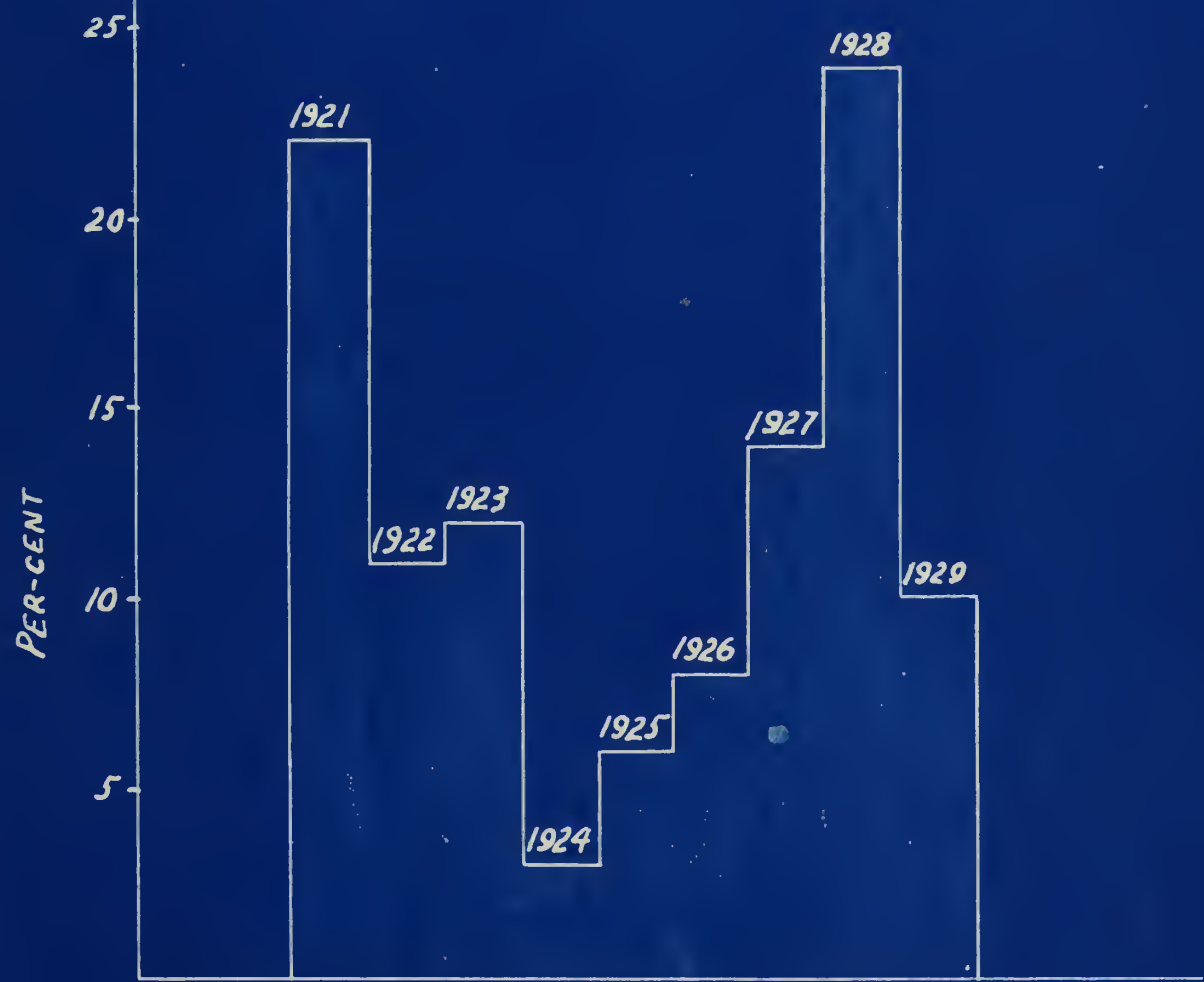


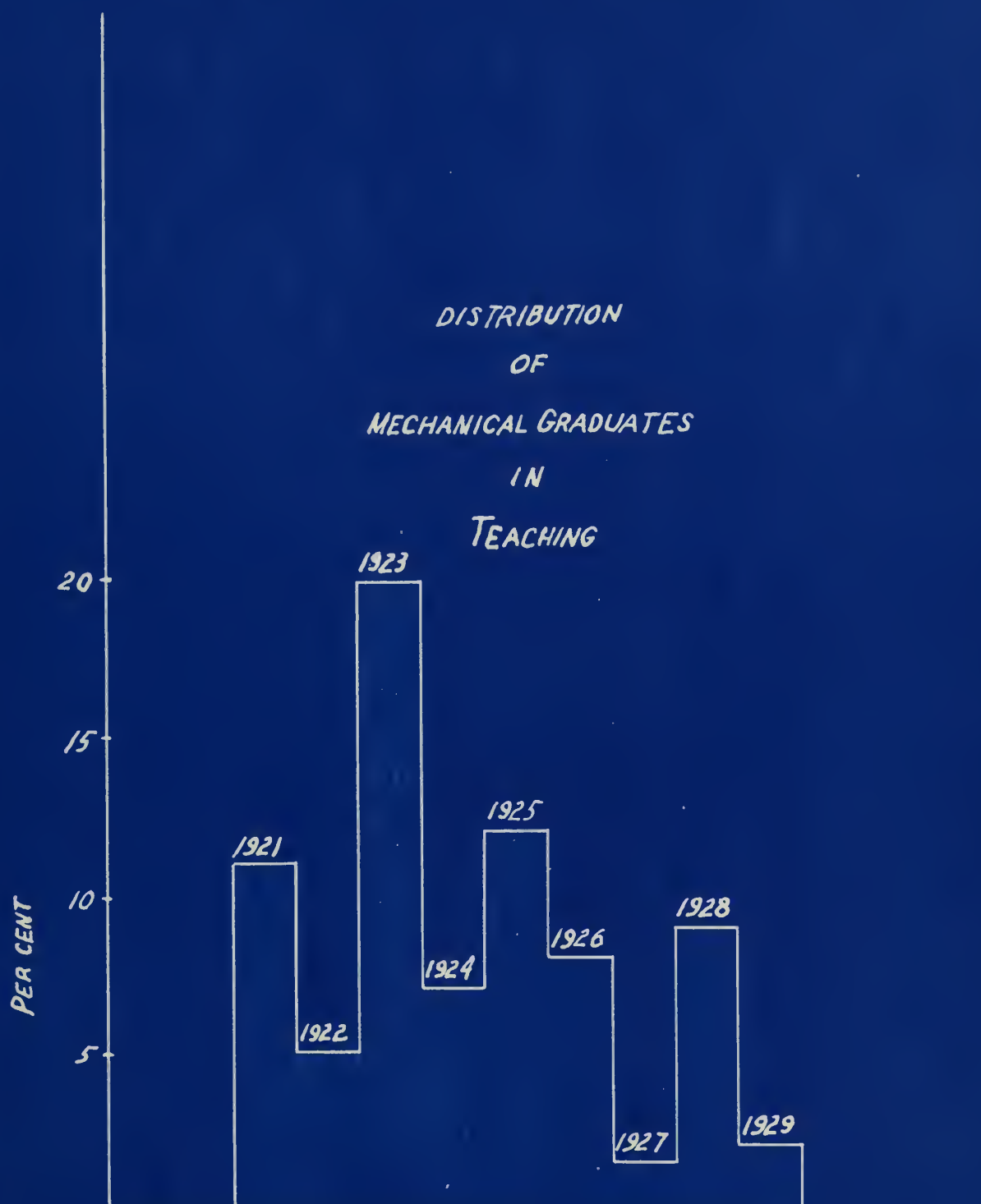
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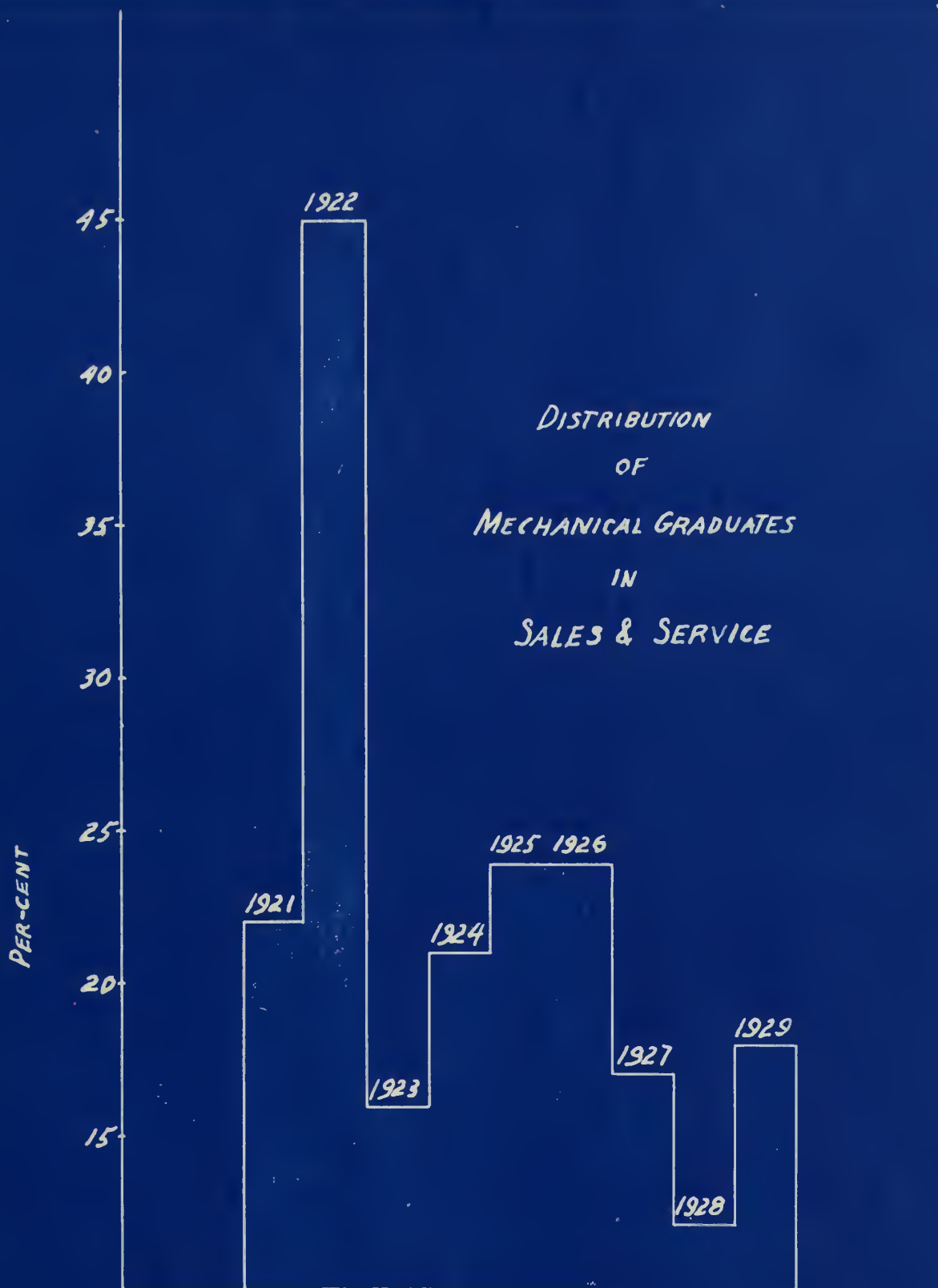
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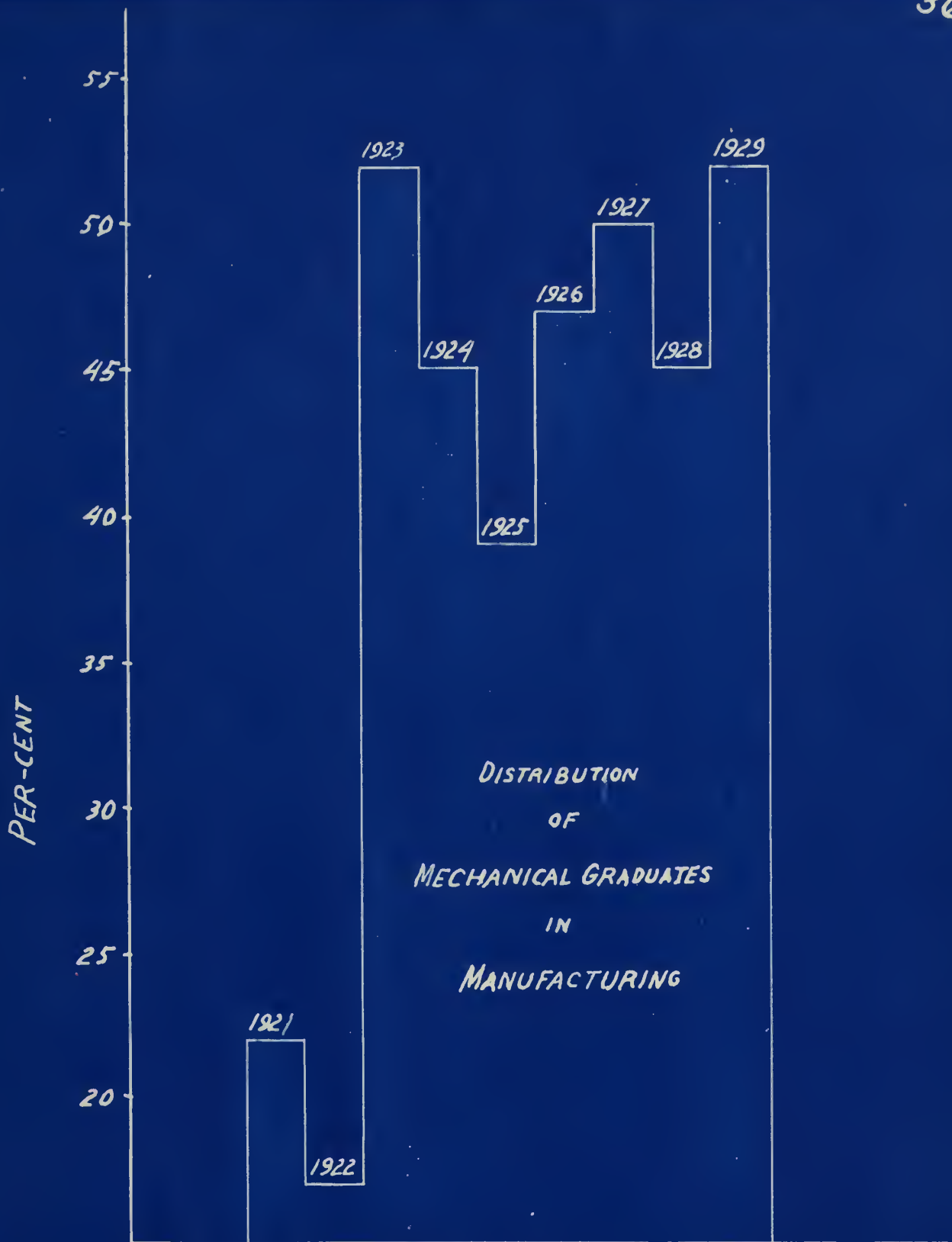


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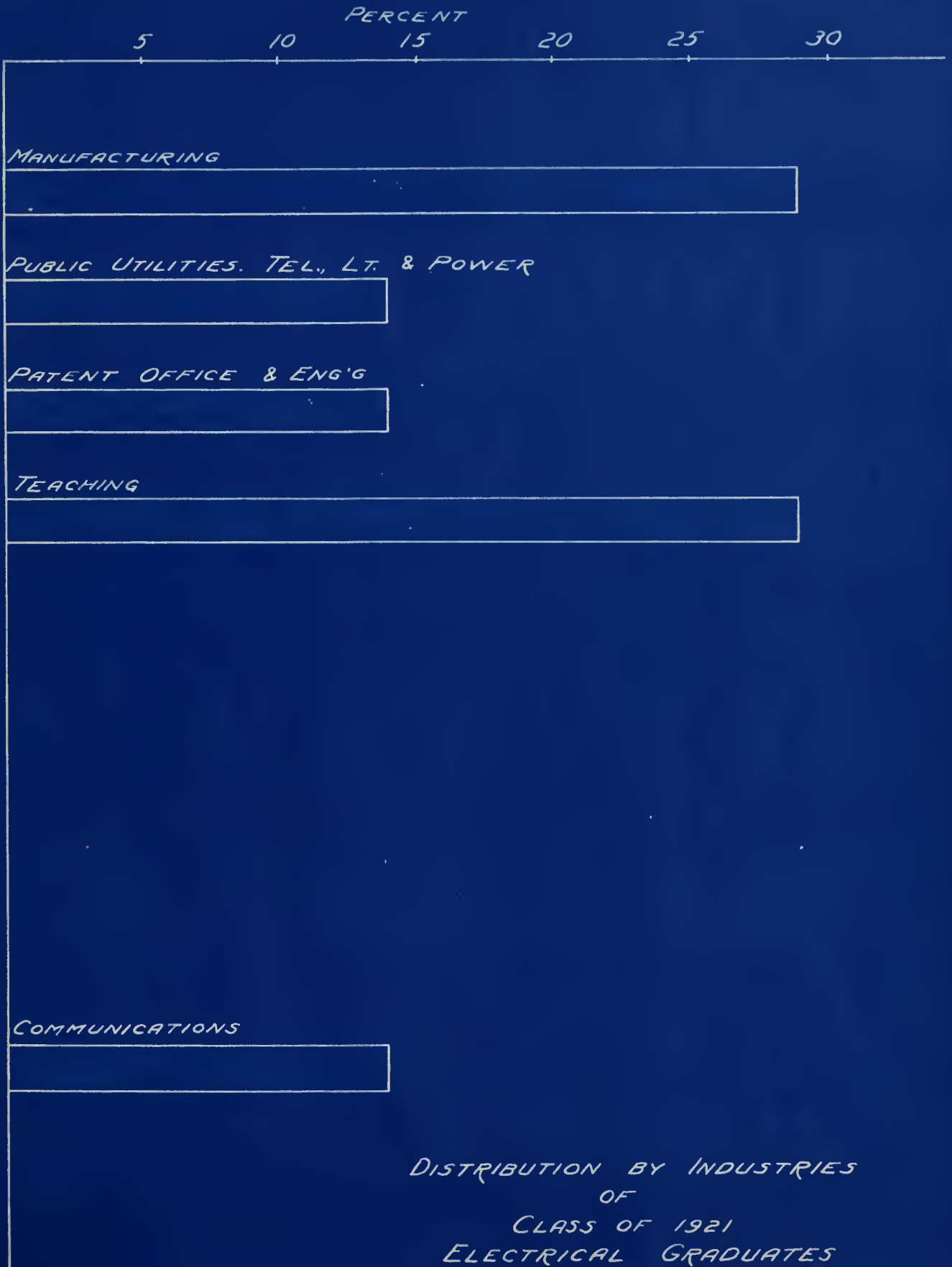


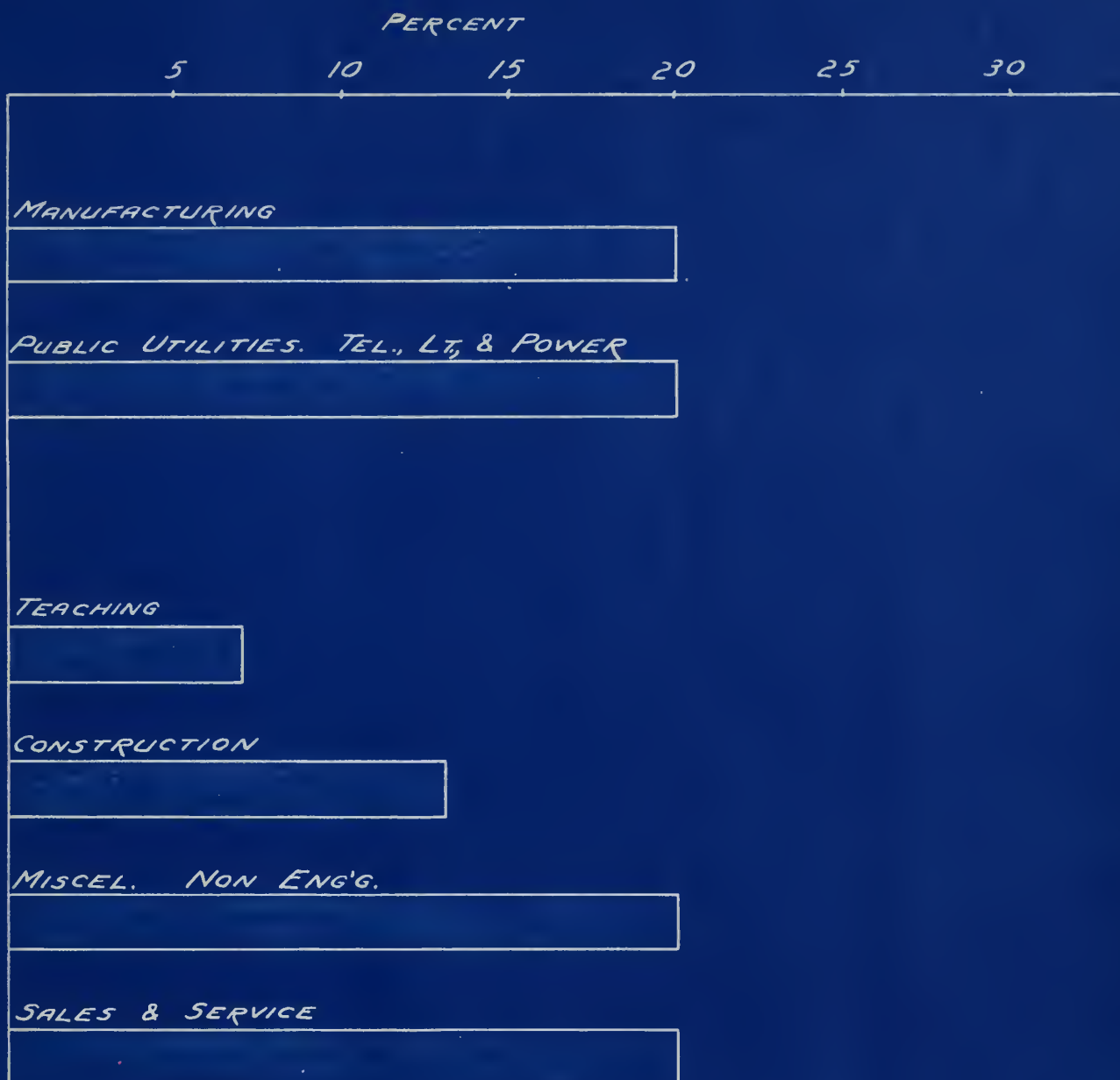


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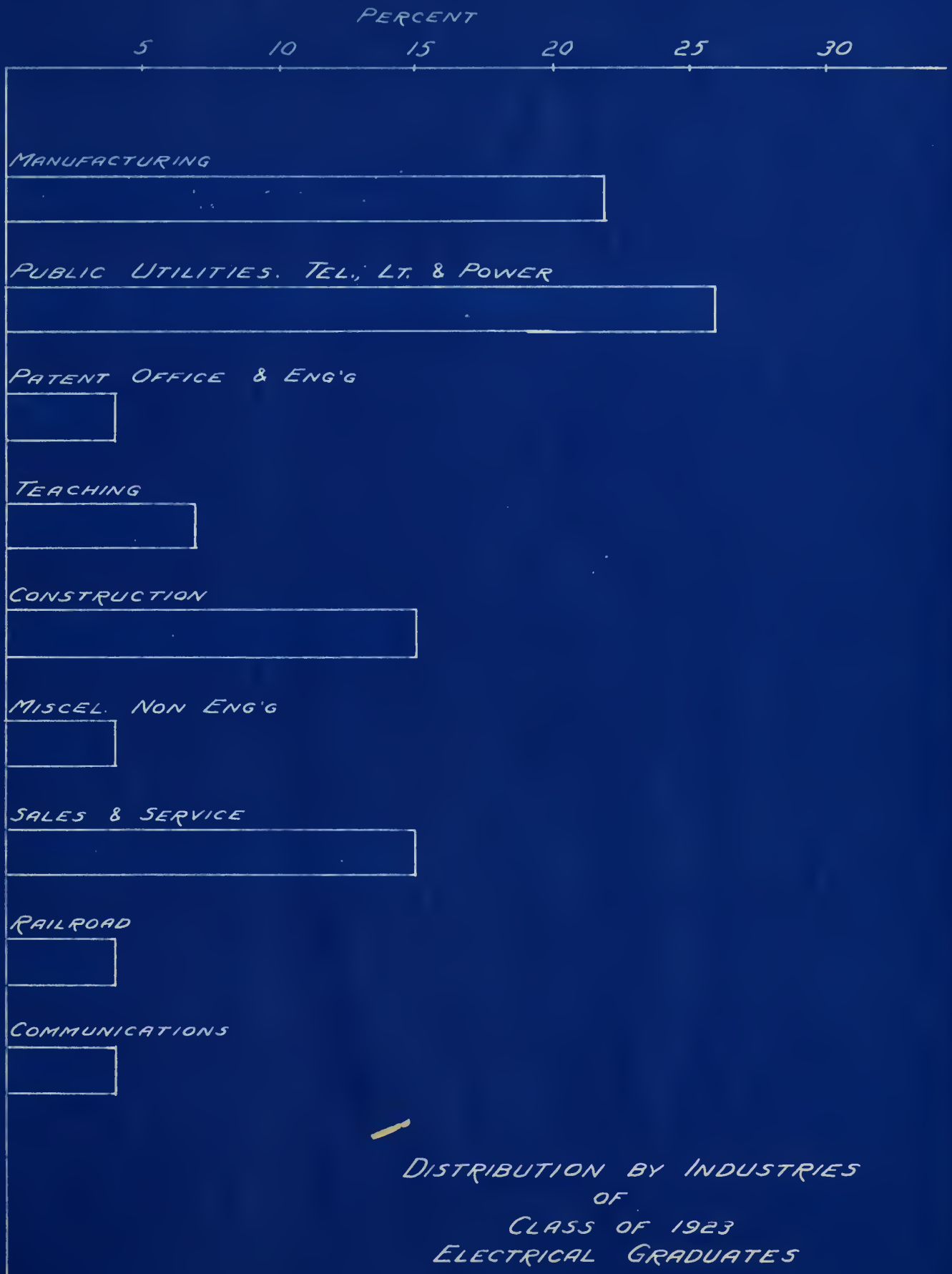


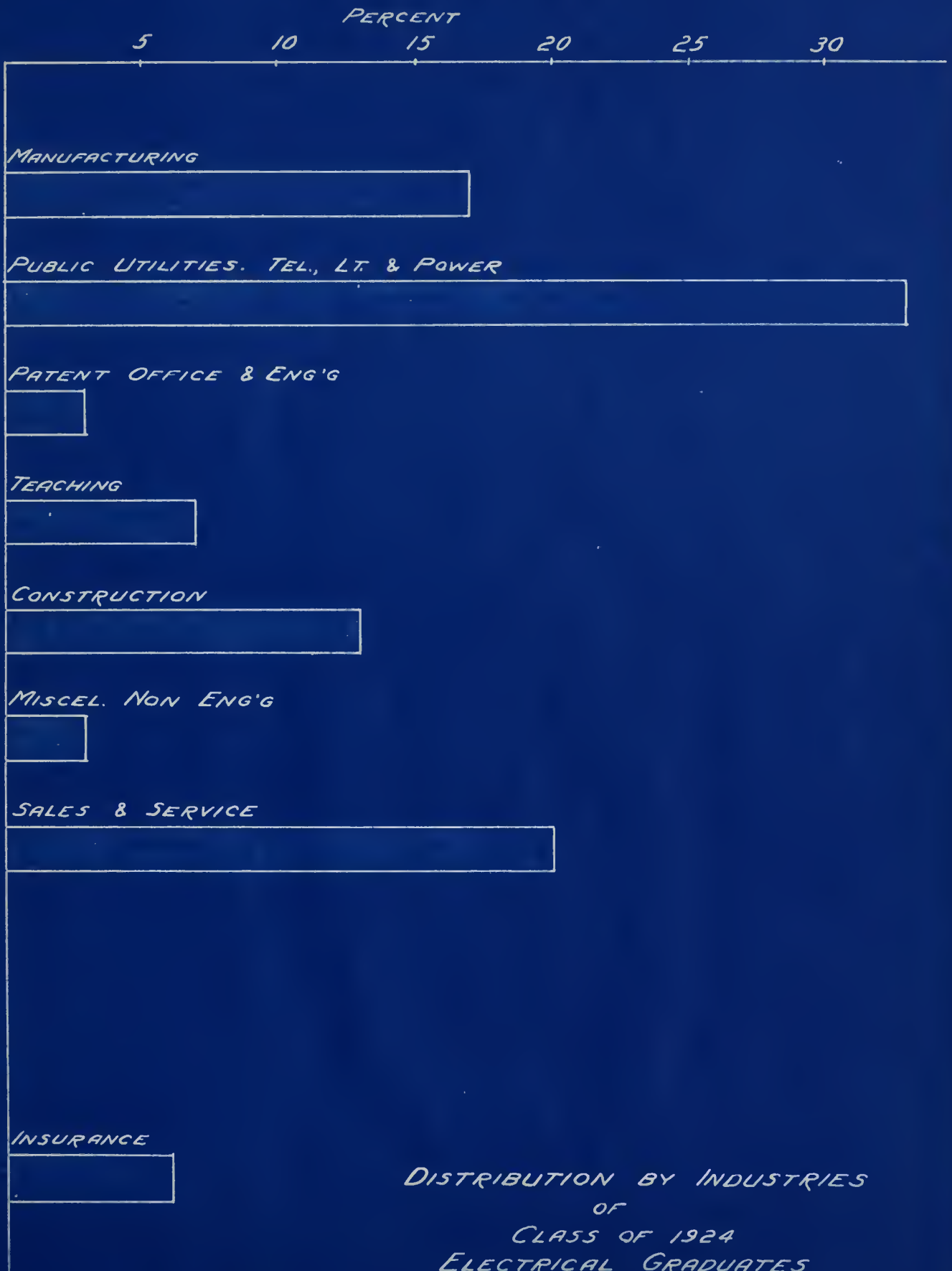
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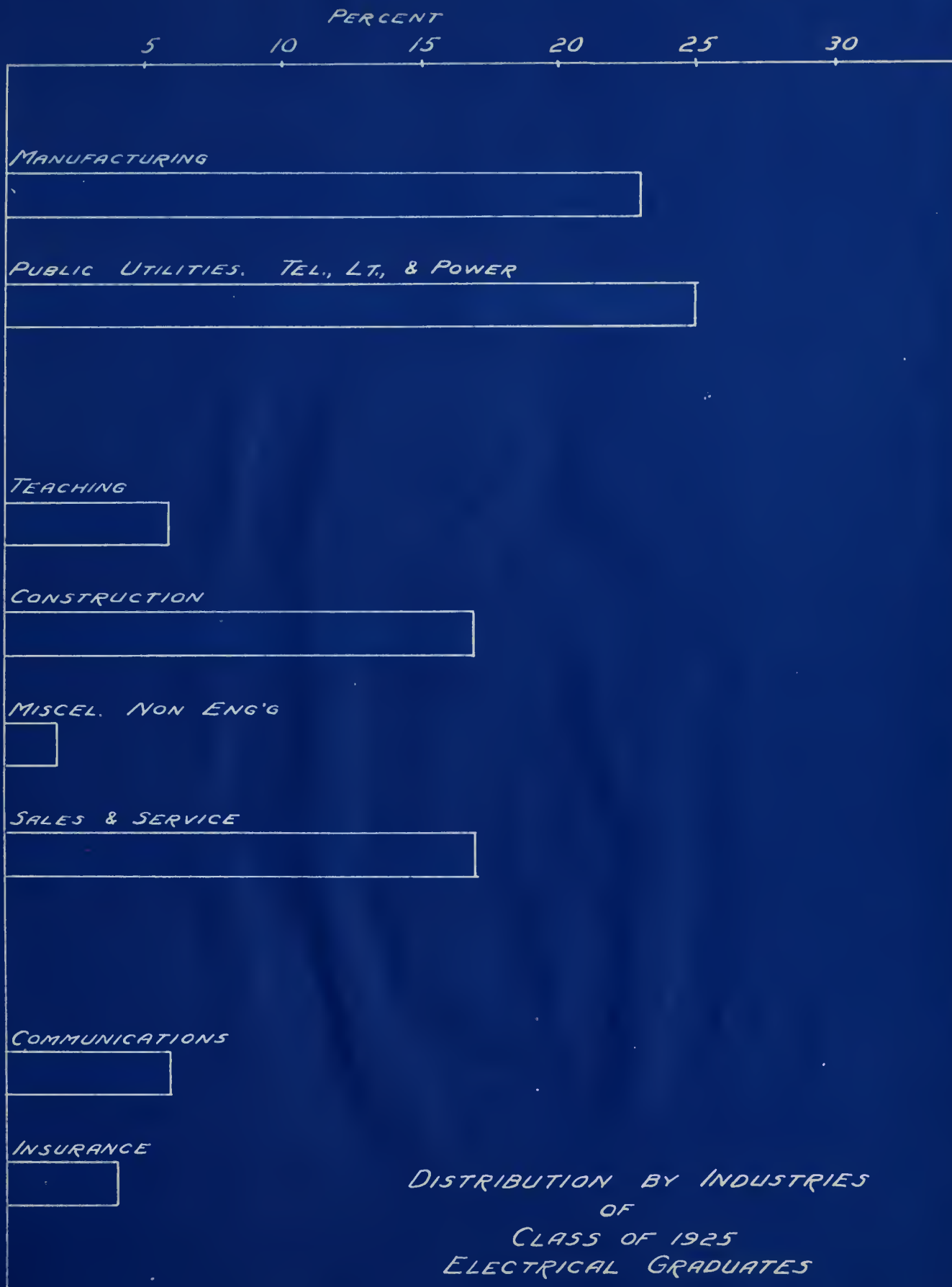


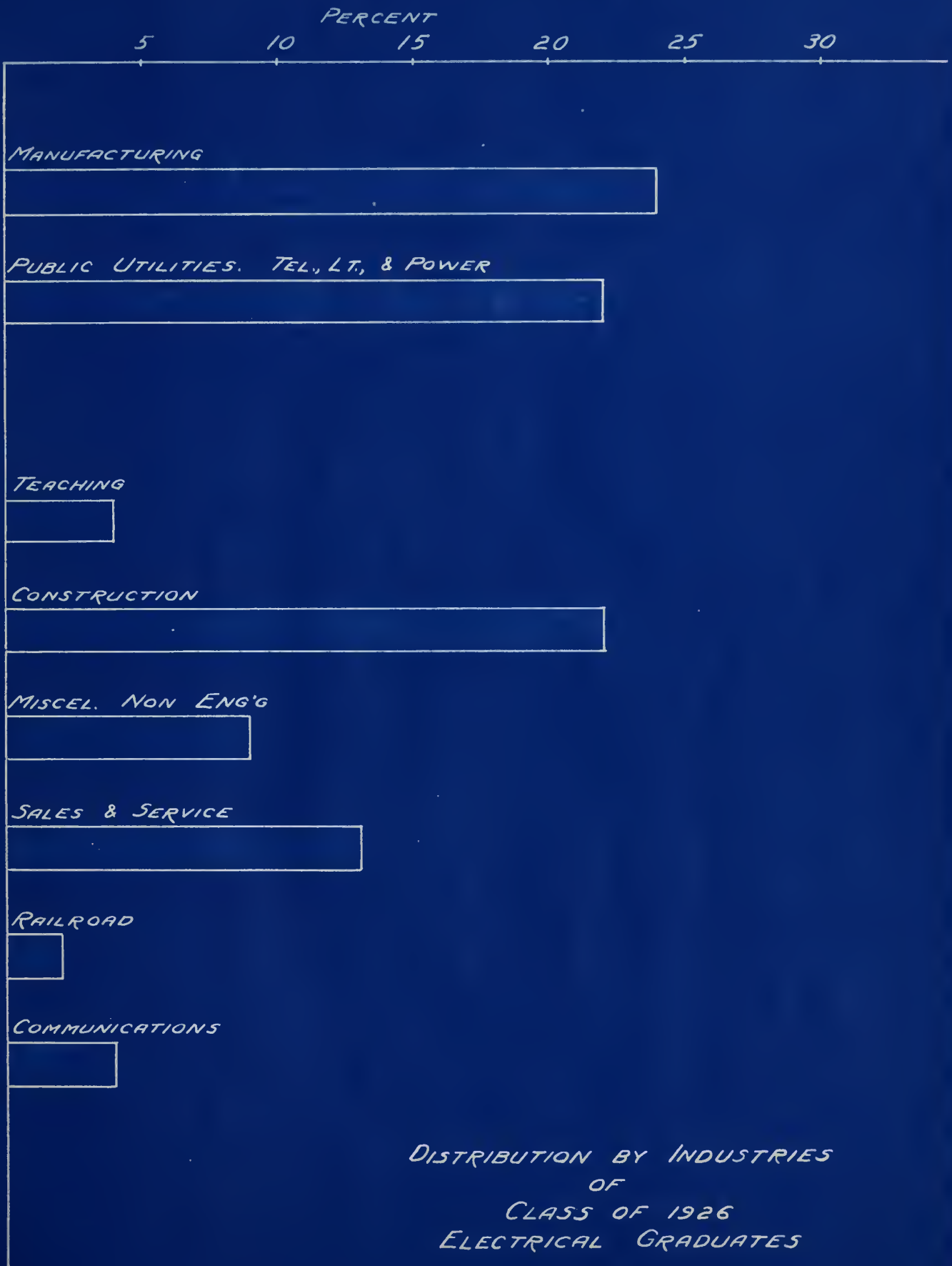


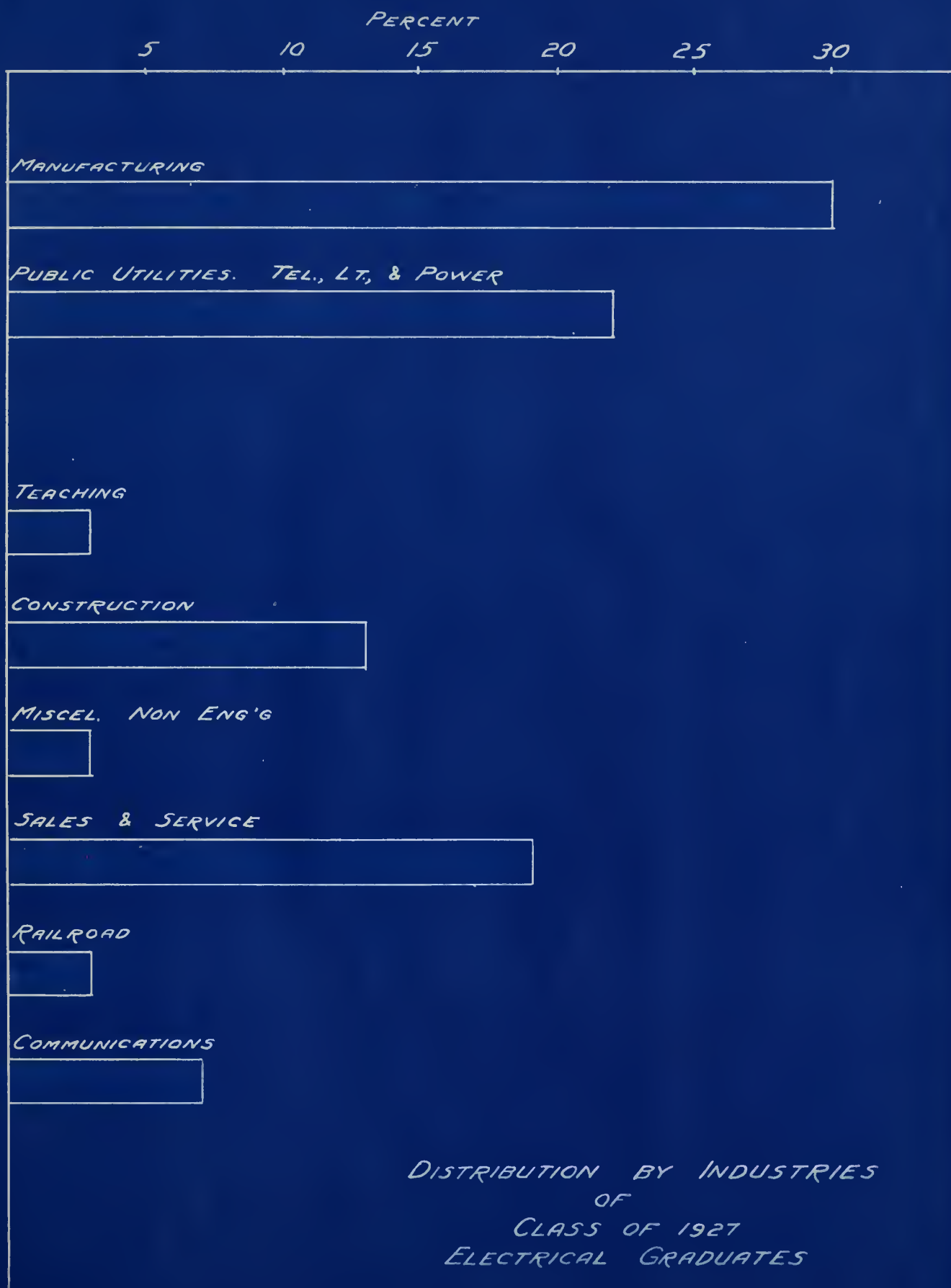
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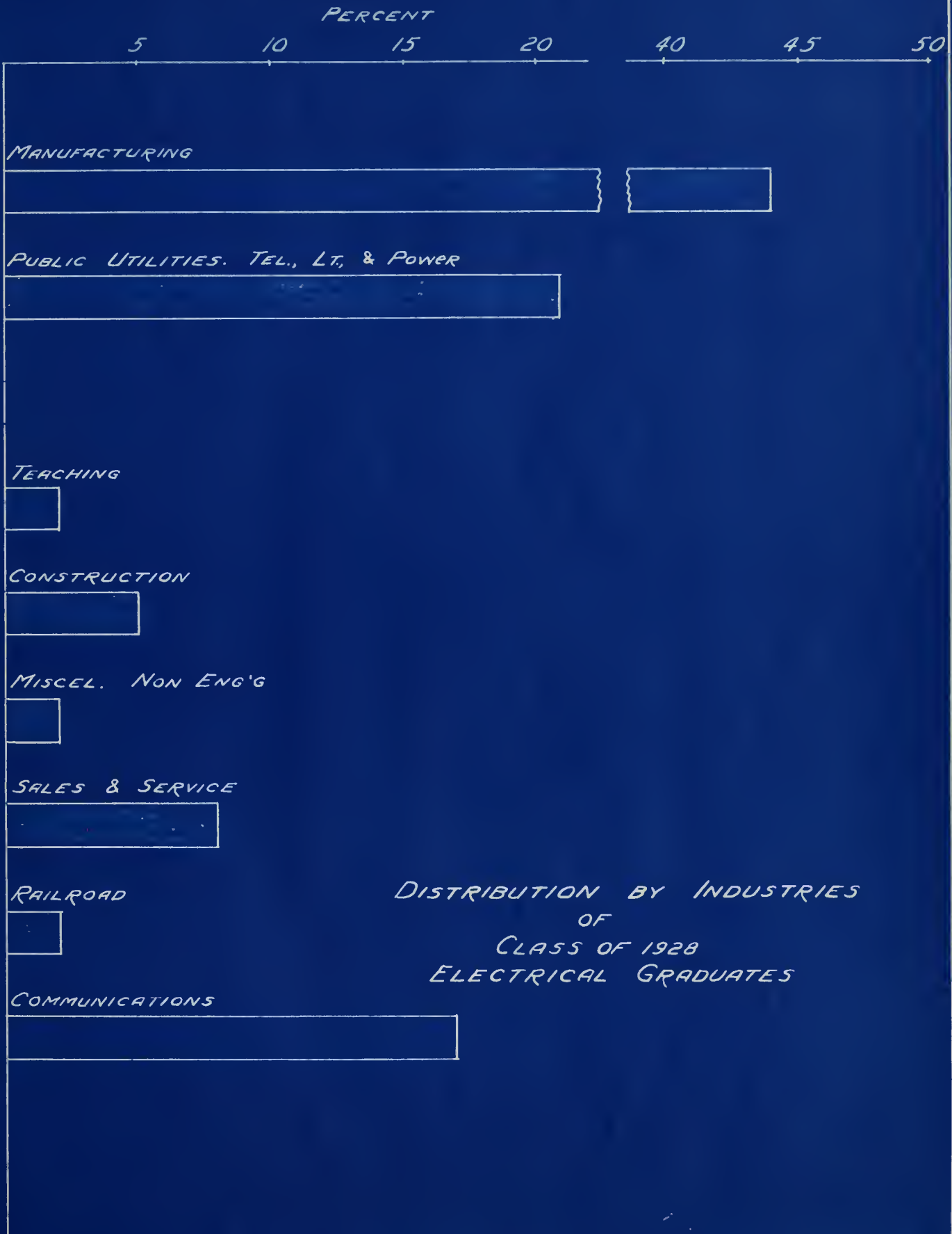




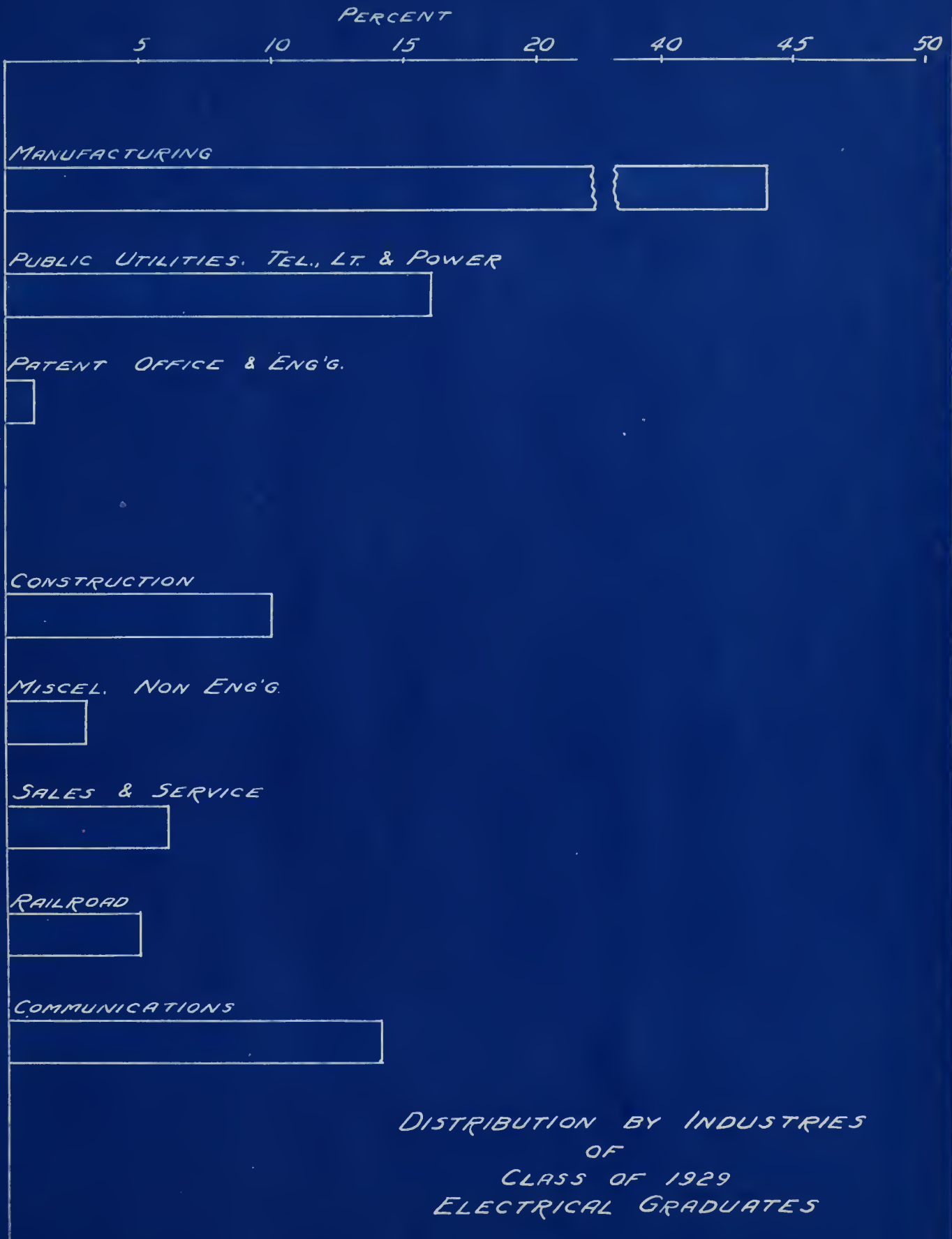


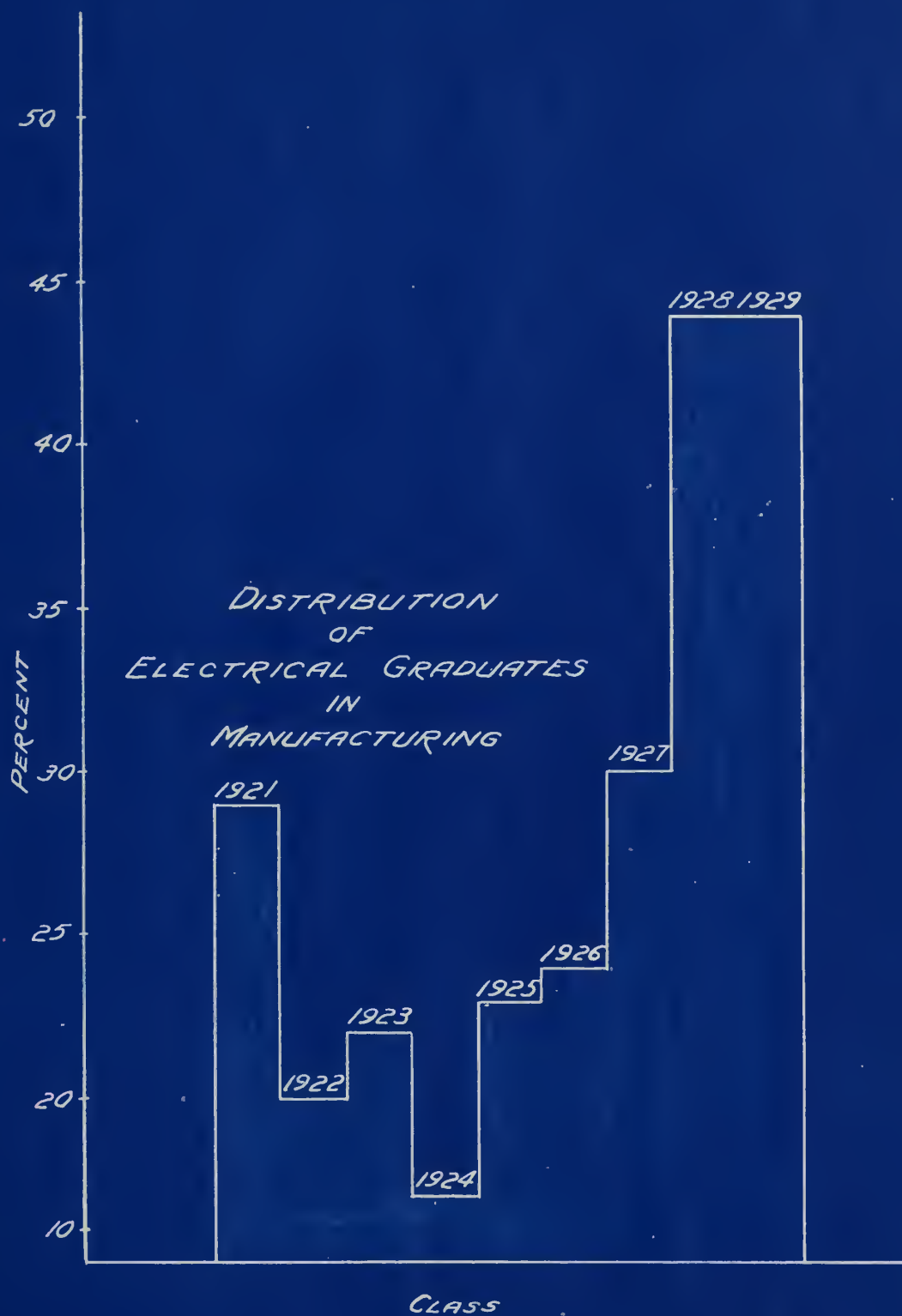


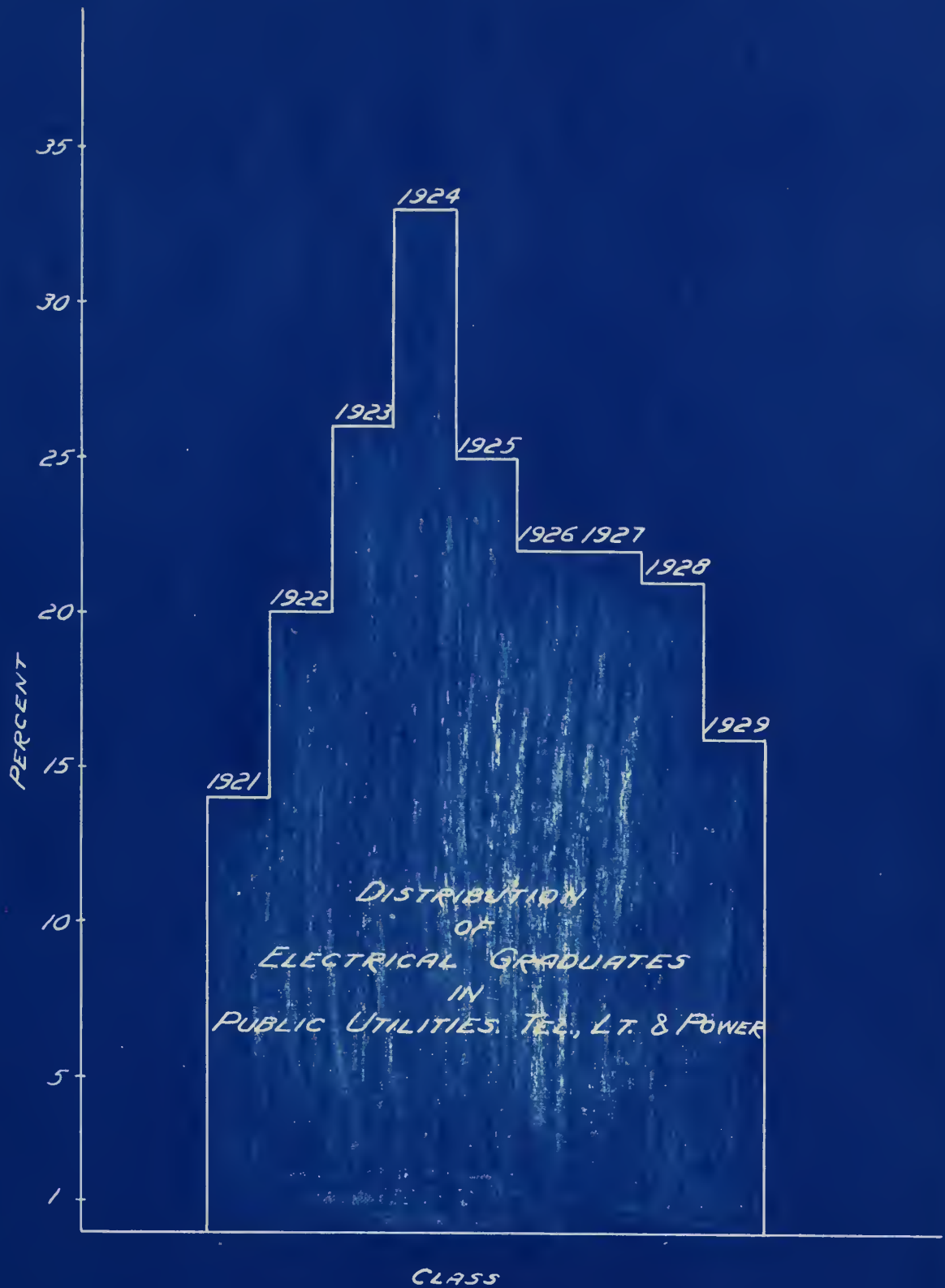


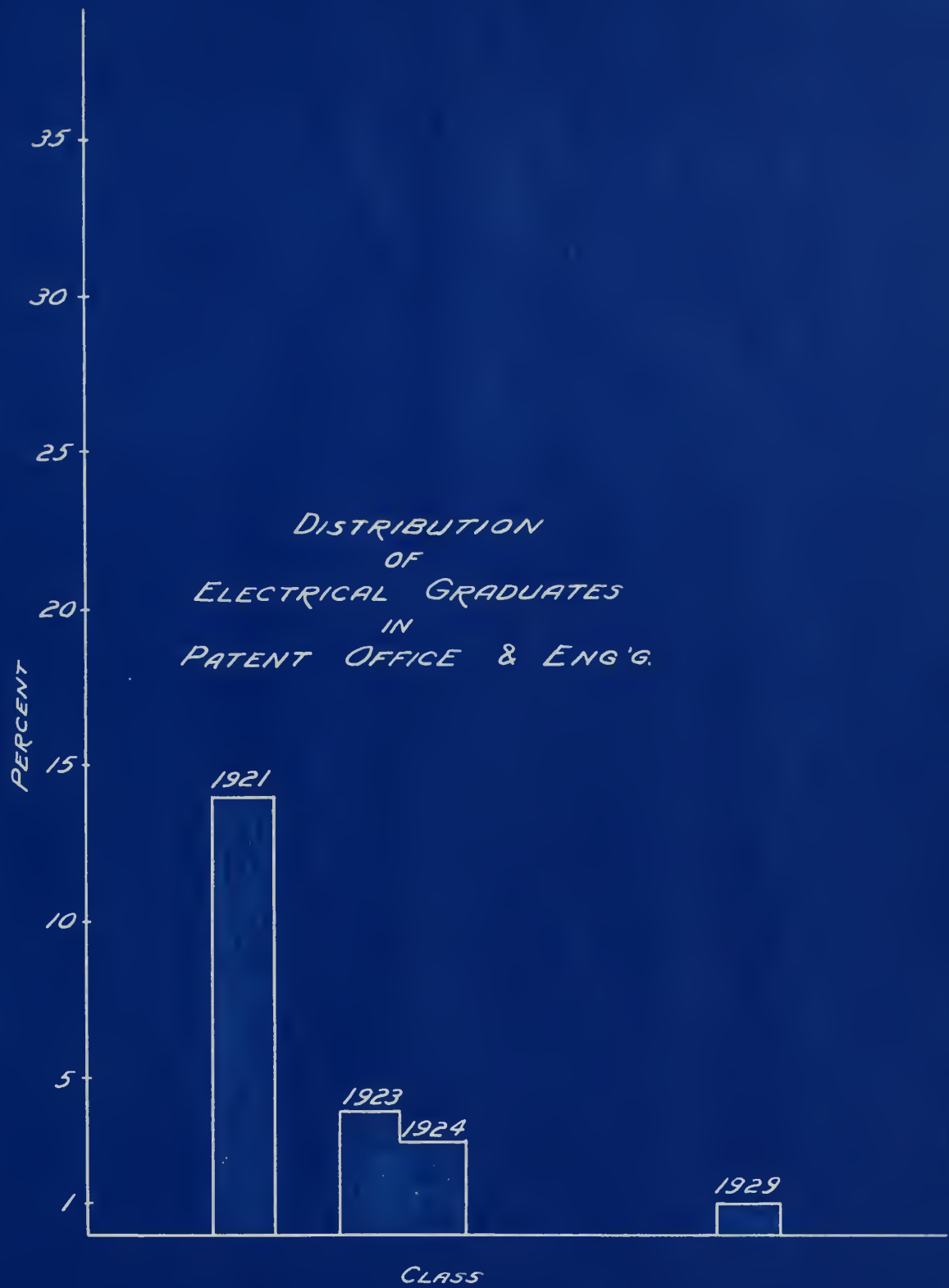


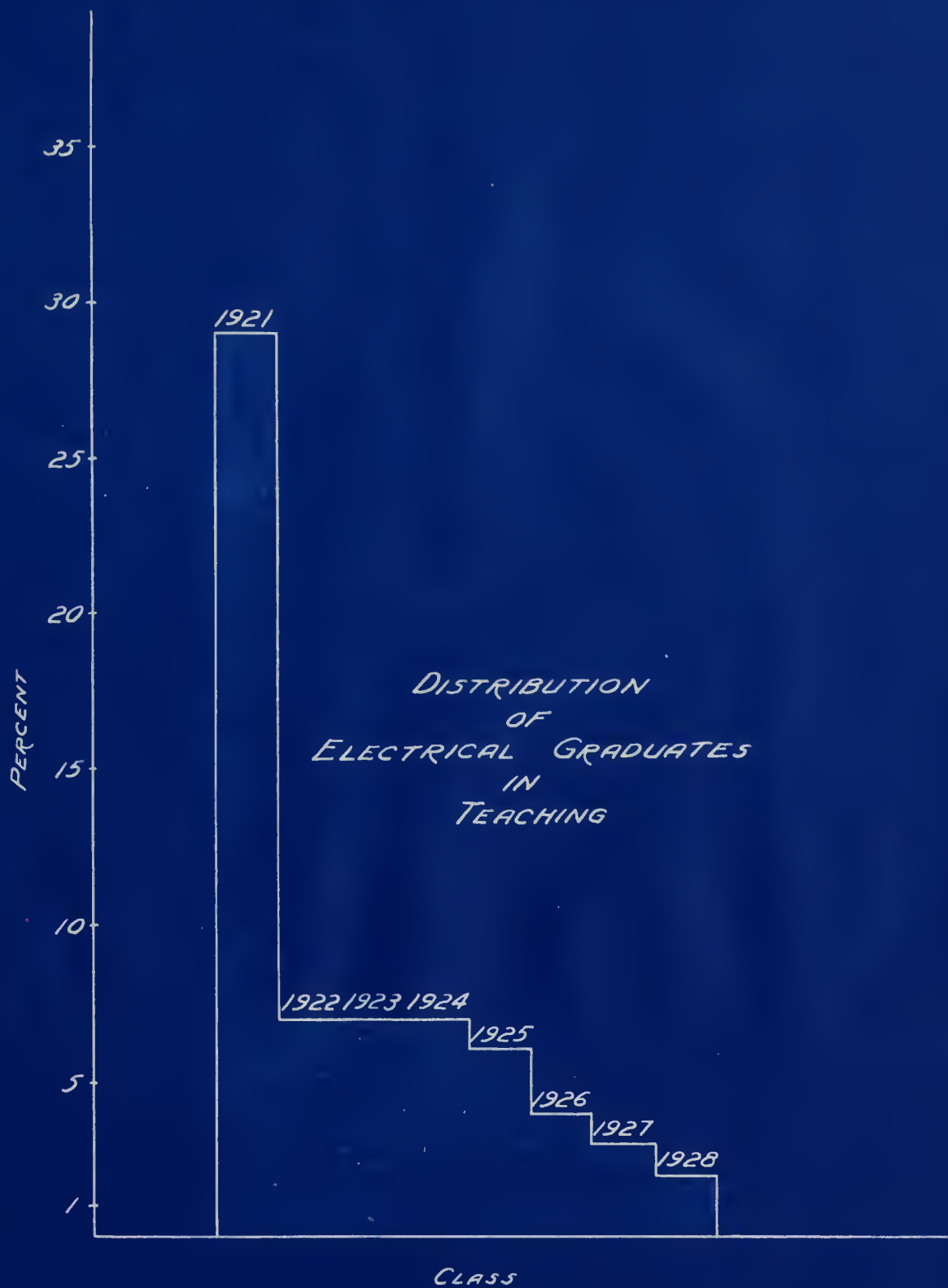
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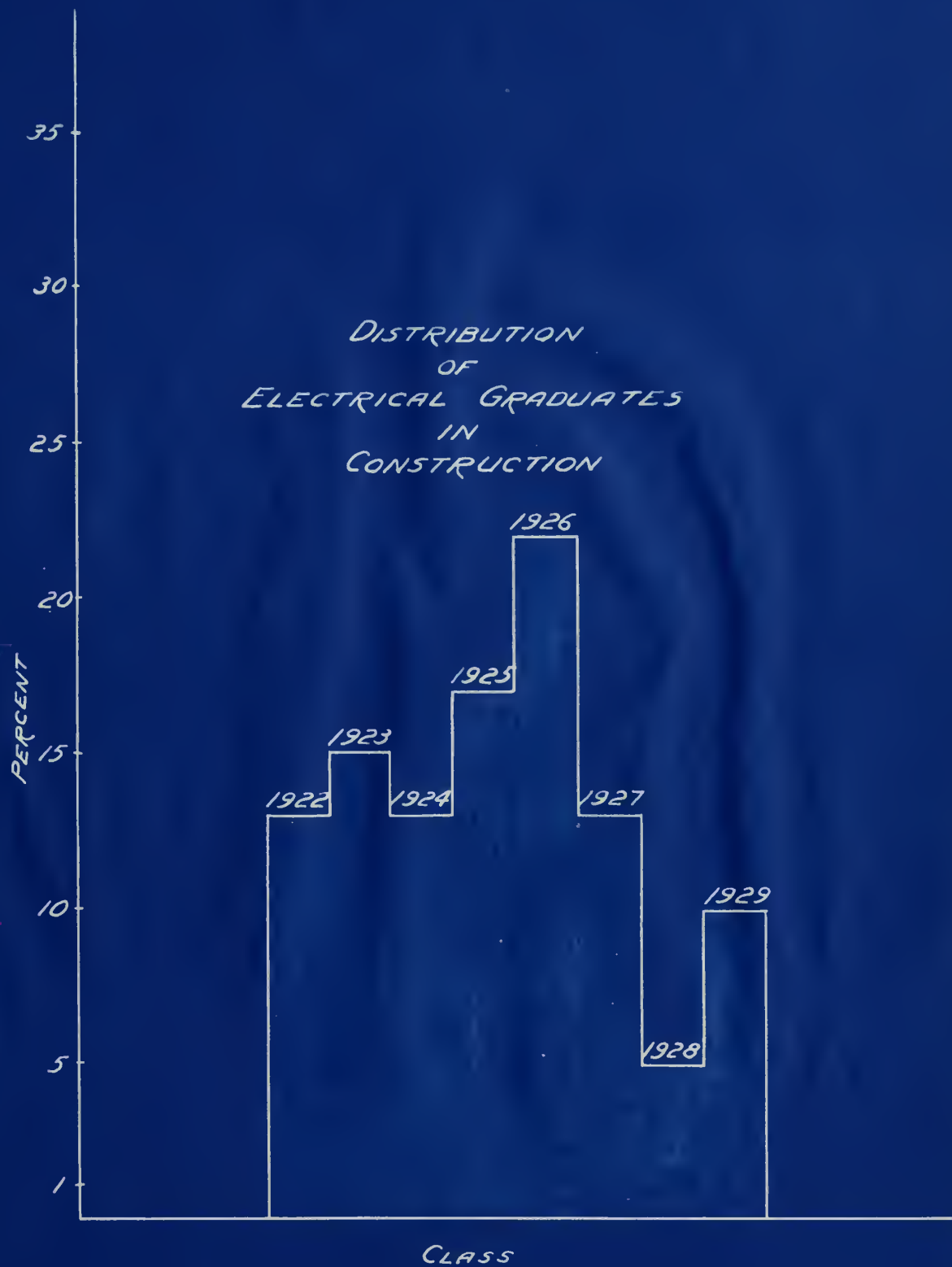




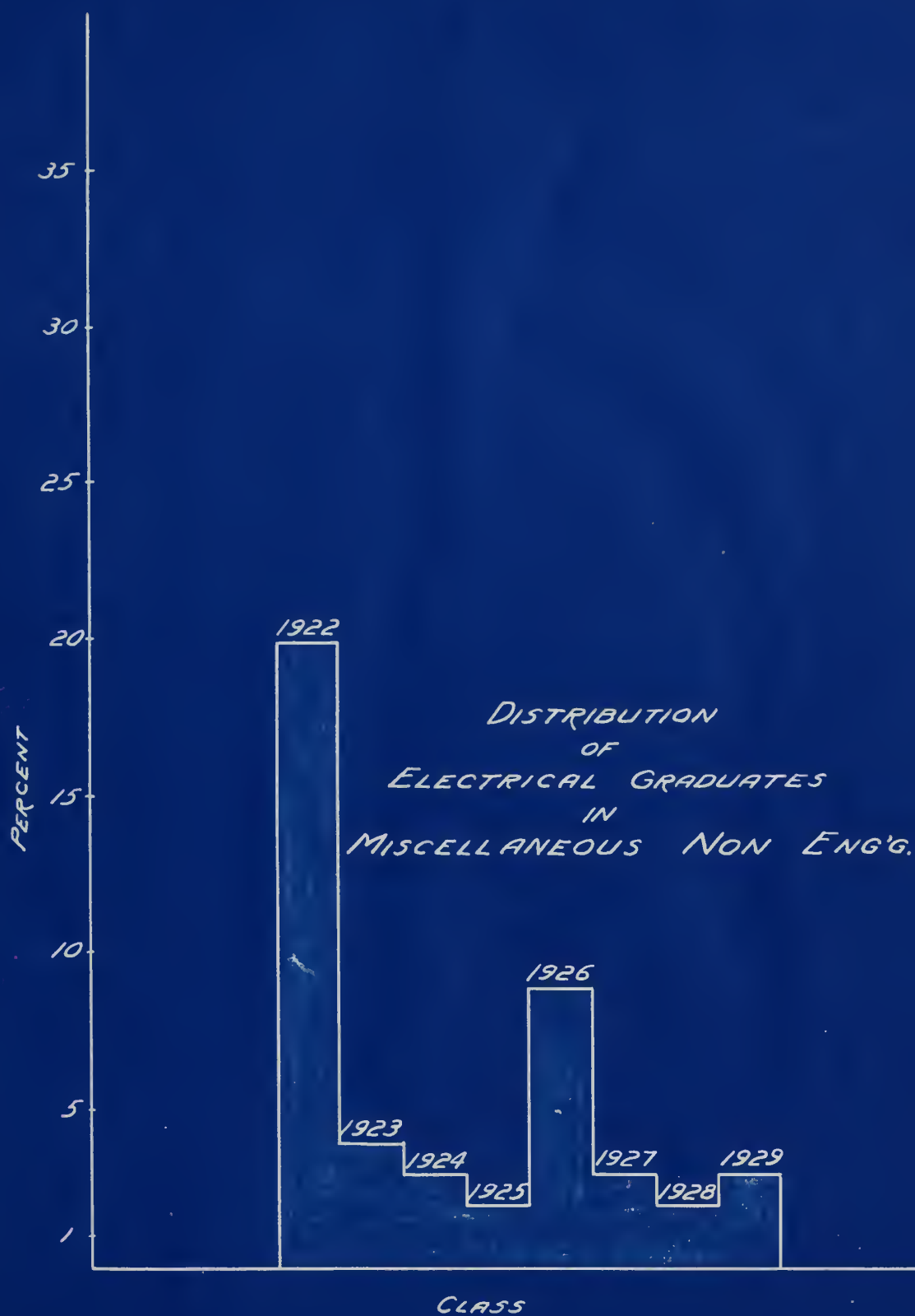




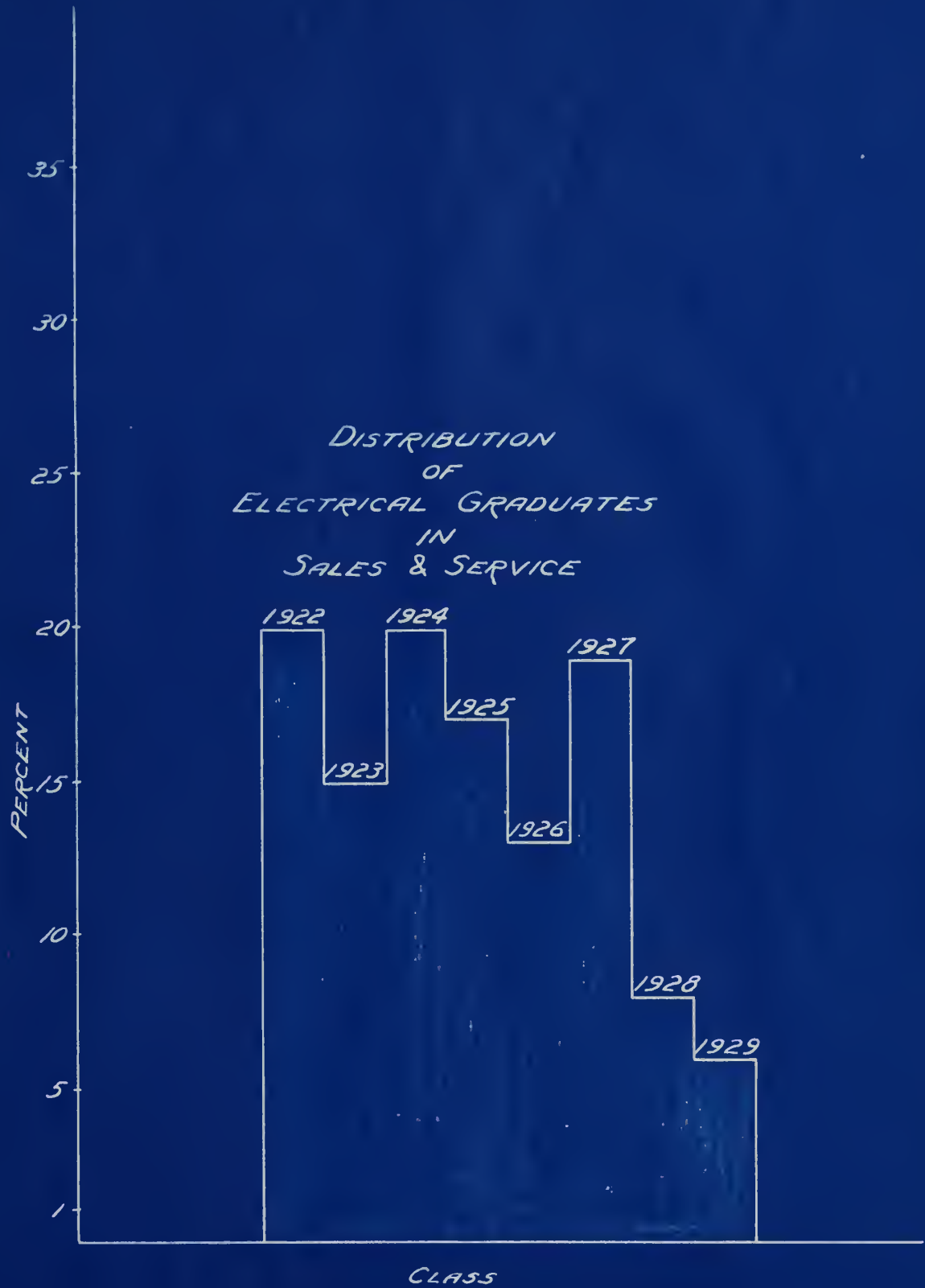


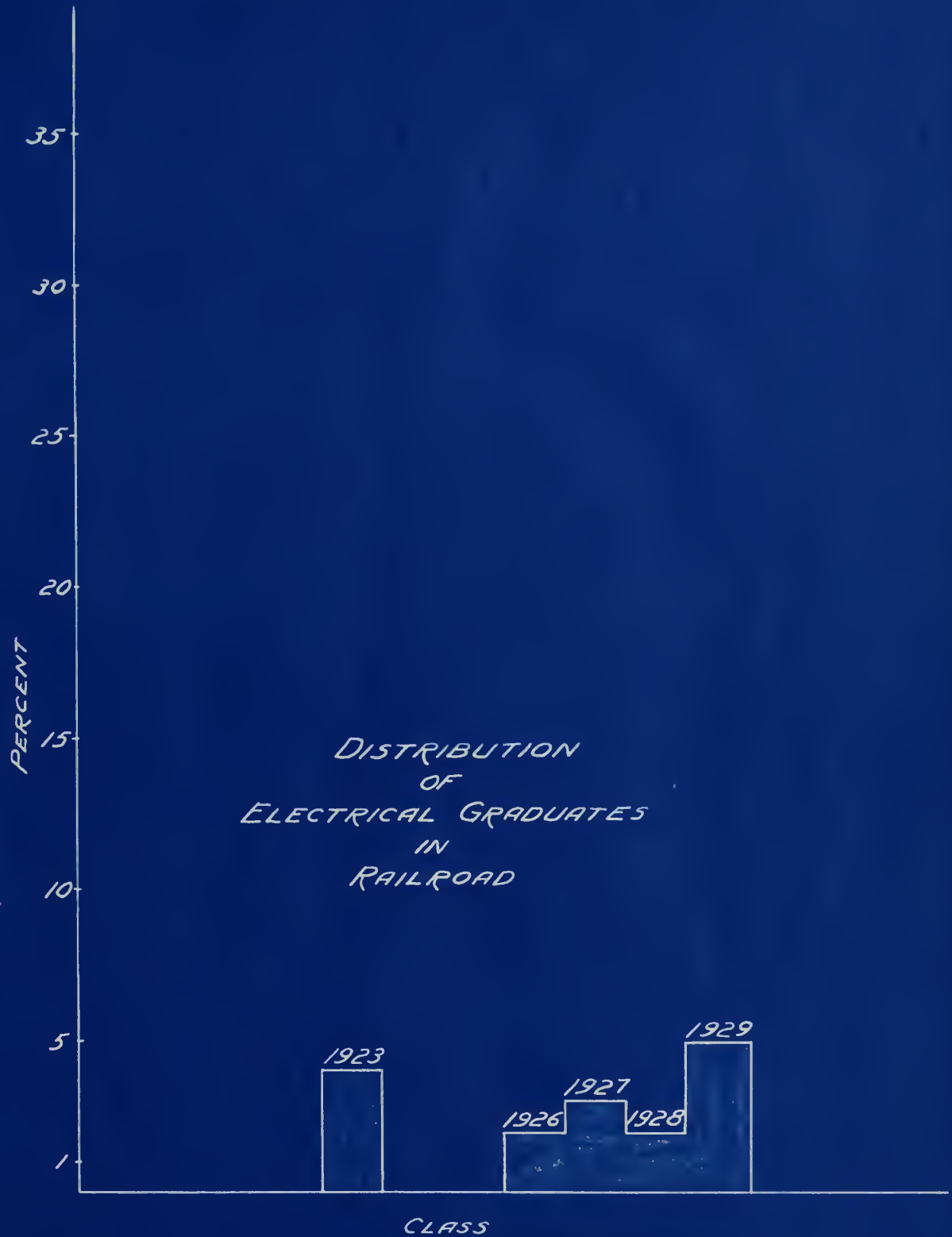


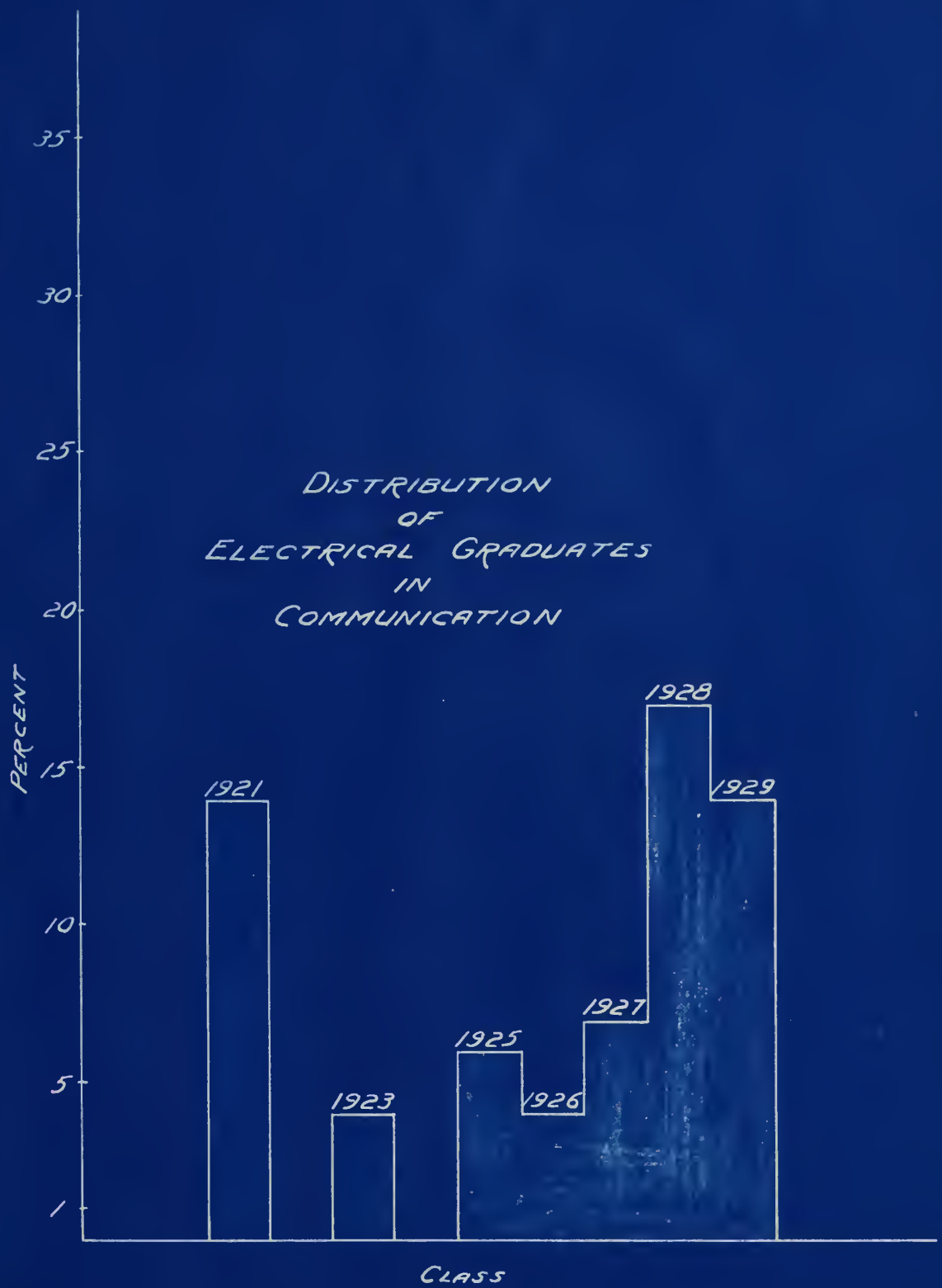


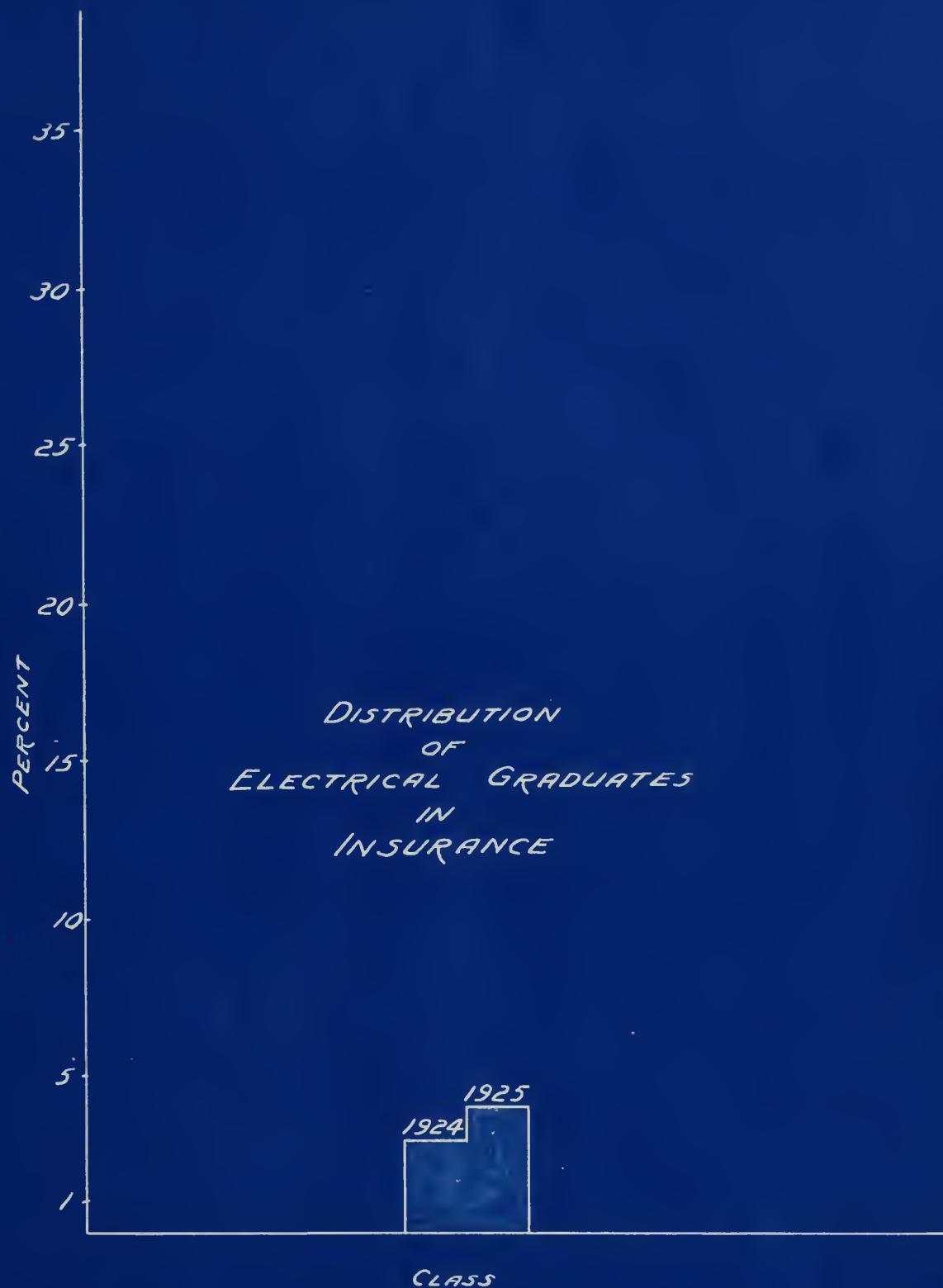




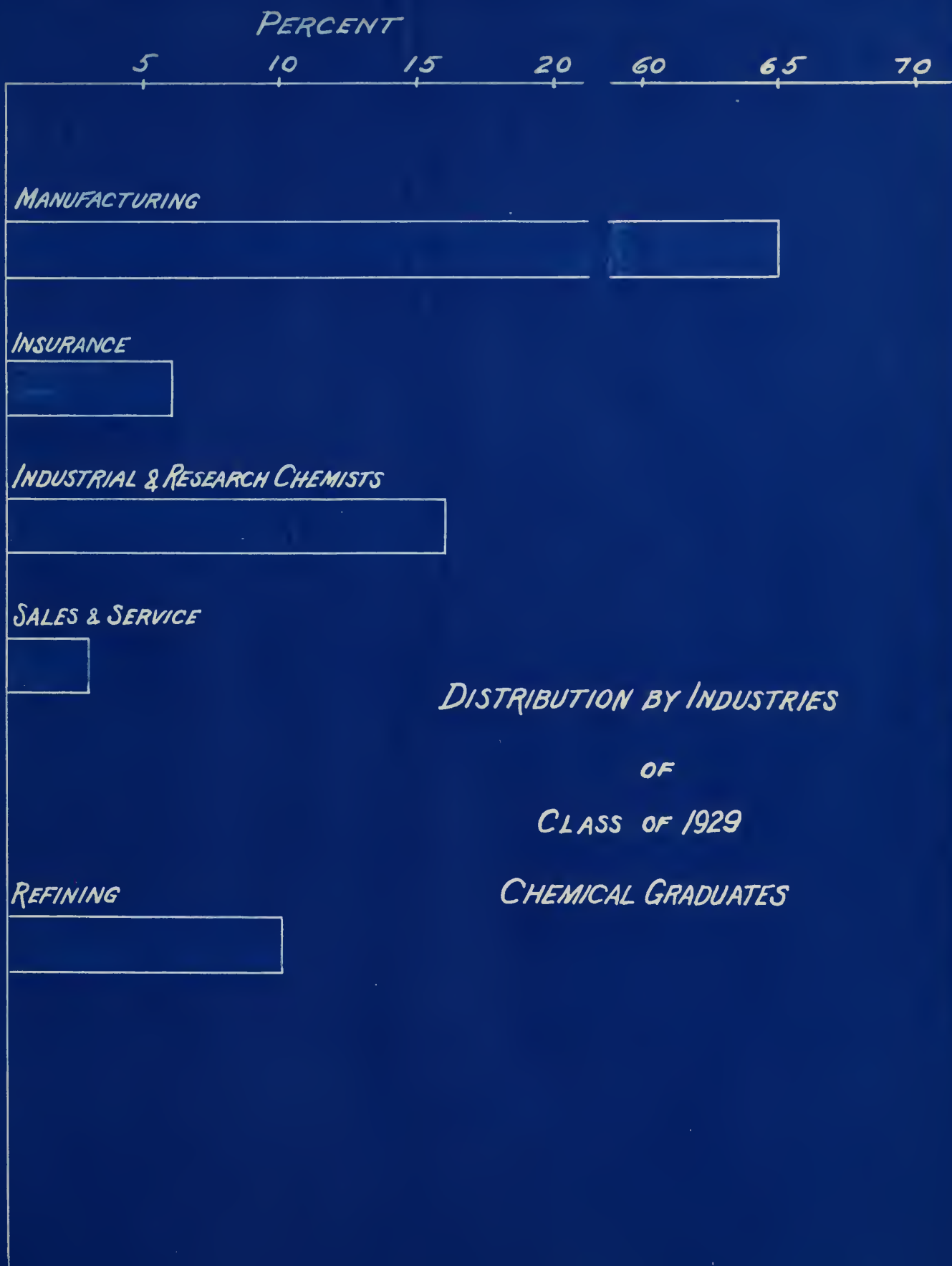








CHEMICAL ENGINEERING GRADUATES



PERCENT

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MANUFACTURING

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PUBLIC UTILITIES

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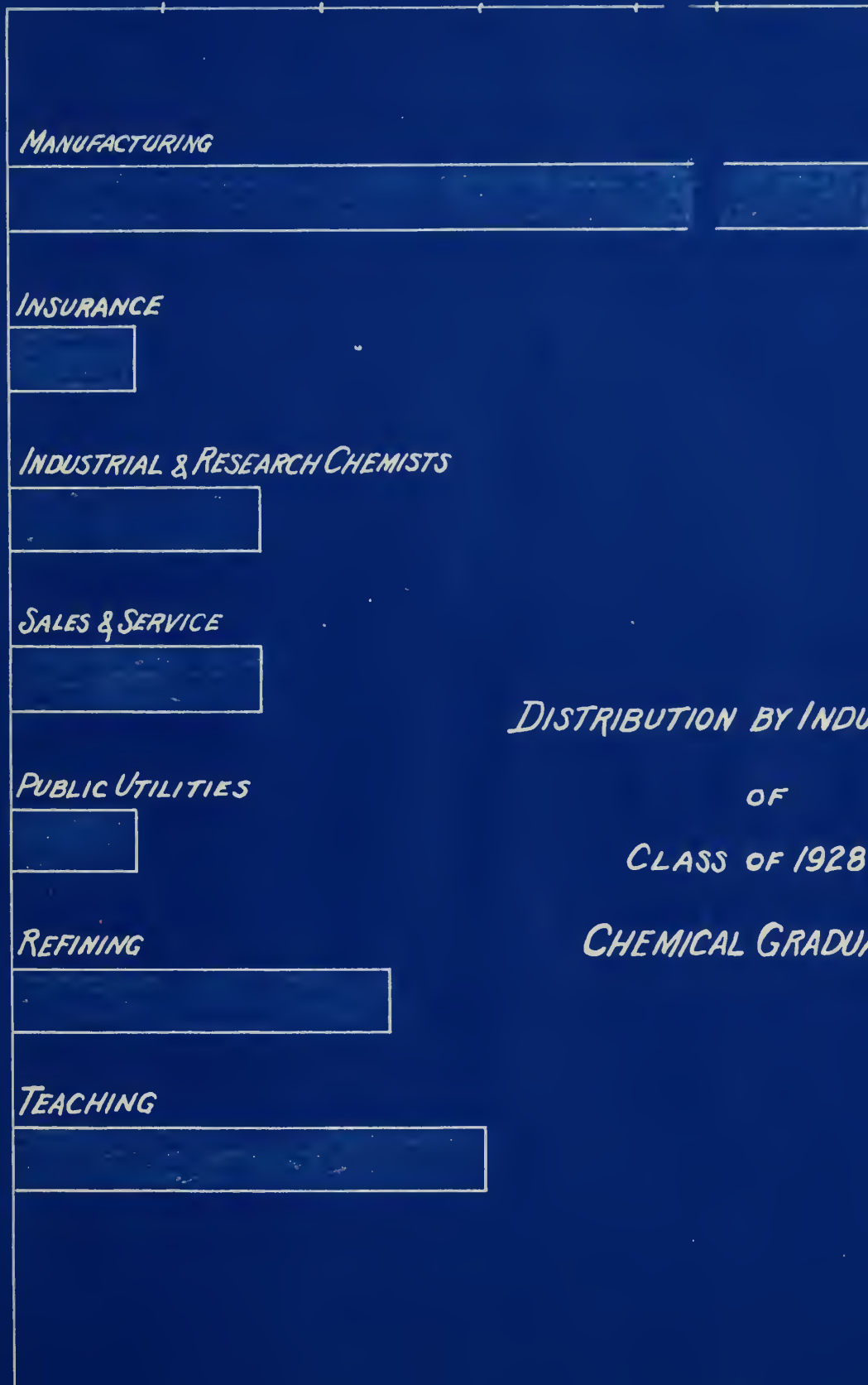
TEACHING

DISTRIBUTION BY INDUSTRIES

OF

CLASS OF 1928

CHEMICAL GRADUATES



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DISTRIBUTION BY INDUSTRIES

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CLASS OF 1927

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MANUFACTURING

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DISTRIBUTION BY INDUSTRIES

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CLASS OF 1926

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CHEMICAL GRADUATES

TEACHING

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INSURANCE

INDUSTRIAL & RESEARCH CHEMISTS

PUBLIC UTILITIES

REFINING

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DISTRIBUTION BY INDUSTRIES

OF

CLASS OF 1925

CHEMICAL GRADUATES

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MANUFACTURING



INDUSTRIAL & RESEARCH CHEMISTS



SALES & SERVICE



DISTRIBUTION BY INDUSTRIES

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CLASS OF 1924

CHEMICAL GRADUATES

TEACHING



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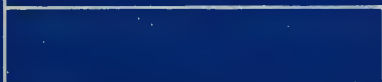
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MANUFACTURING



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DISTRIBUTION BY INDUSTRIES

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CHEMICAL GRADUATES

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DISTRIBUTION BY INDUSTRIES

OF

CLASS OF 1922

CHEMICAL GRADUATES

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MANUFACTURING

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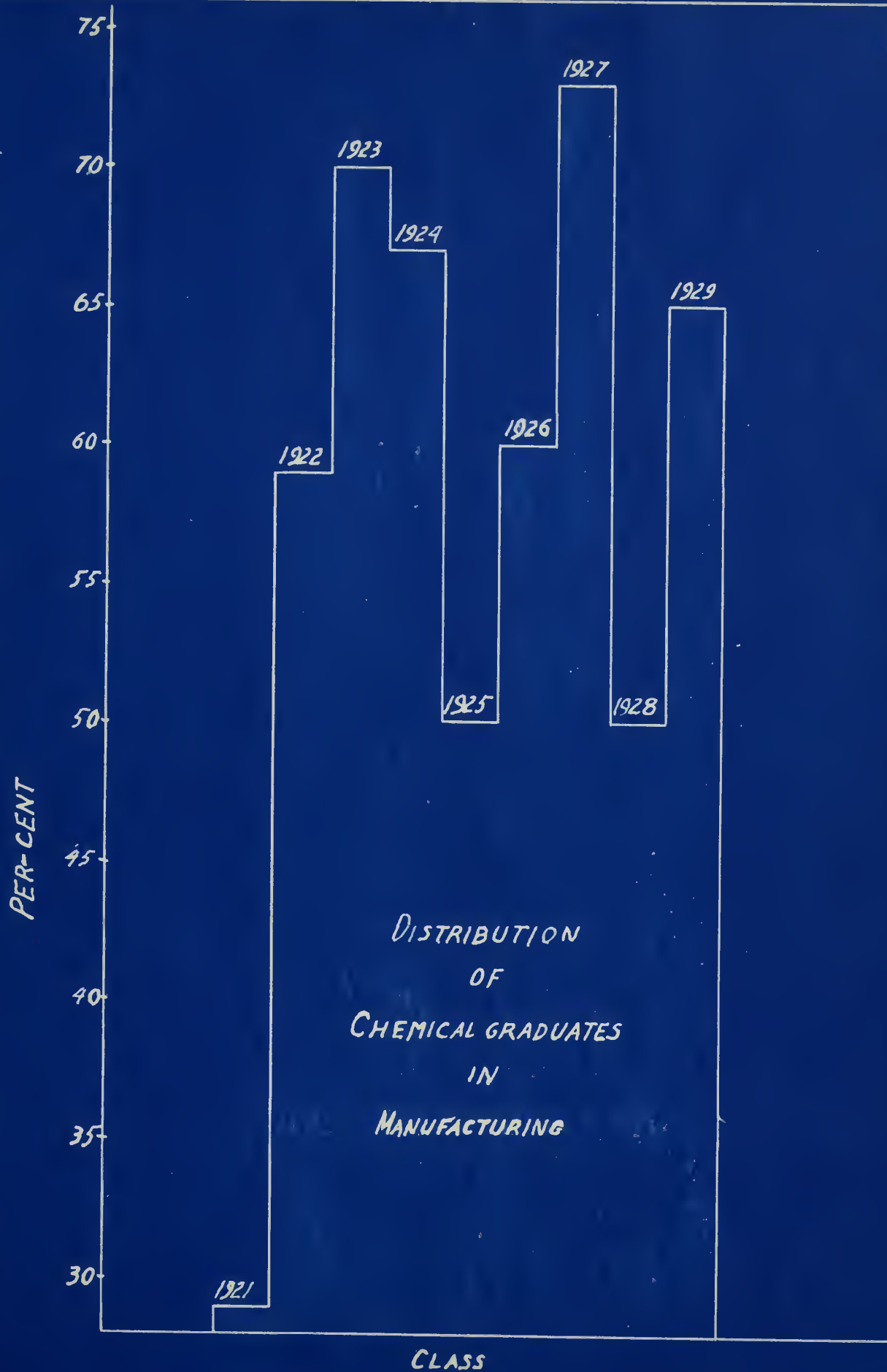
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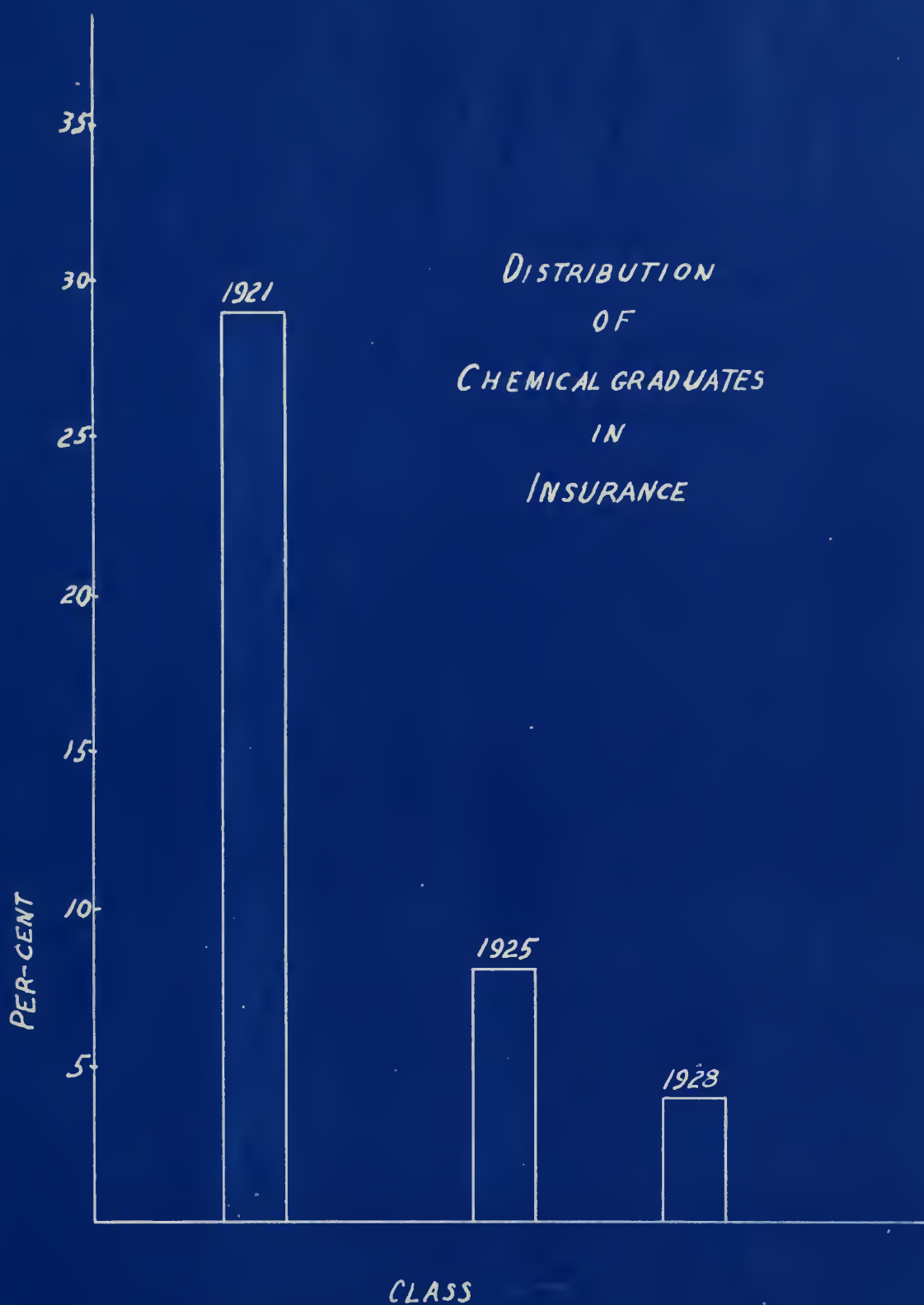
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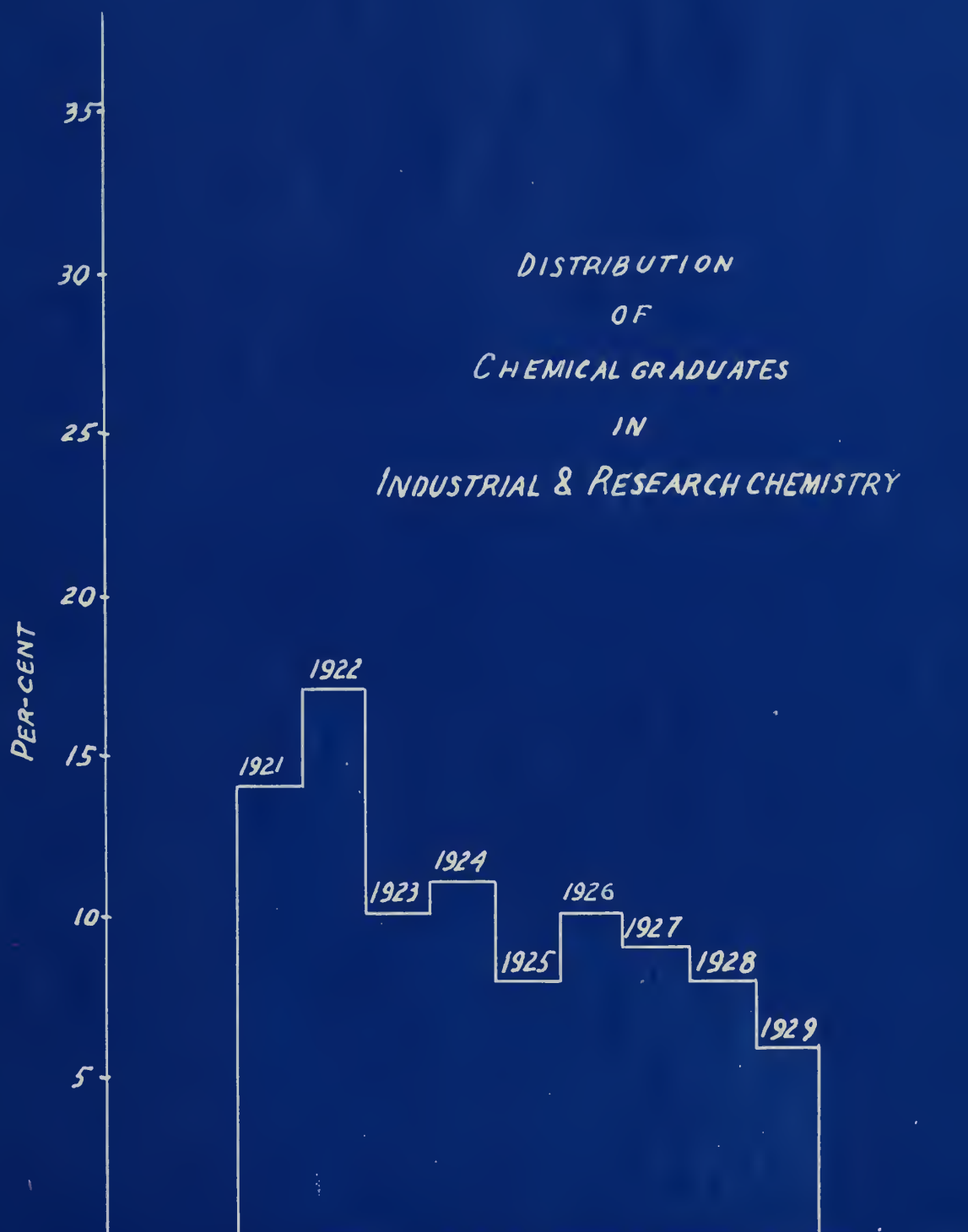
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CLASS OF 1921

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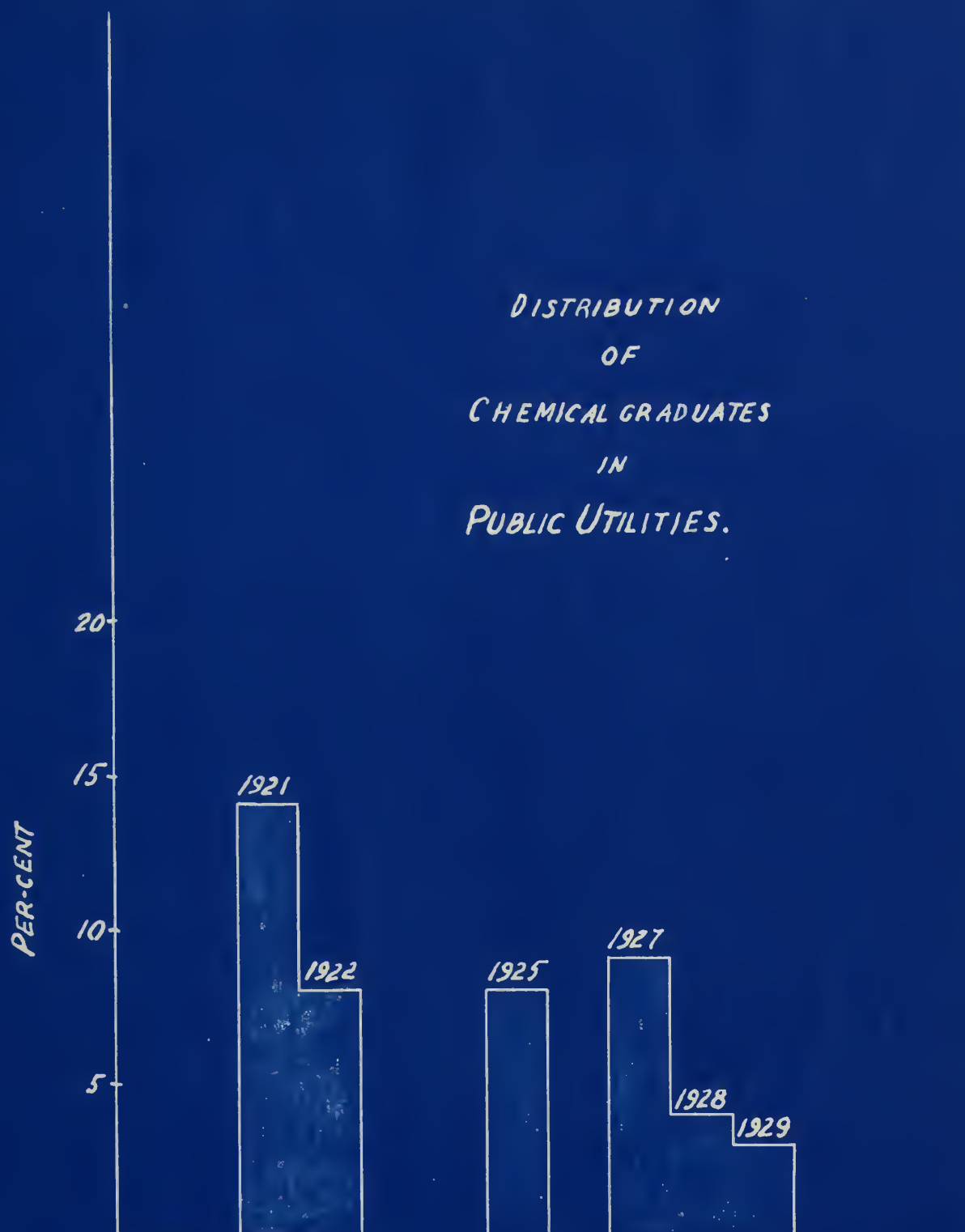




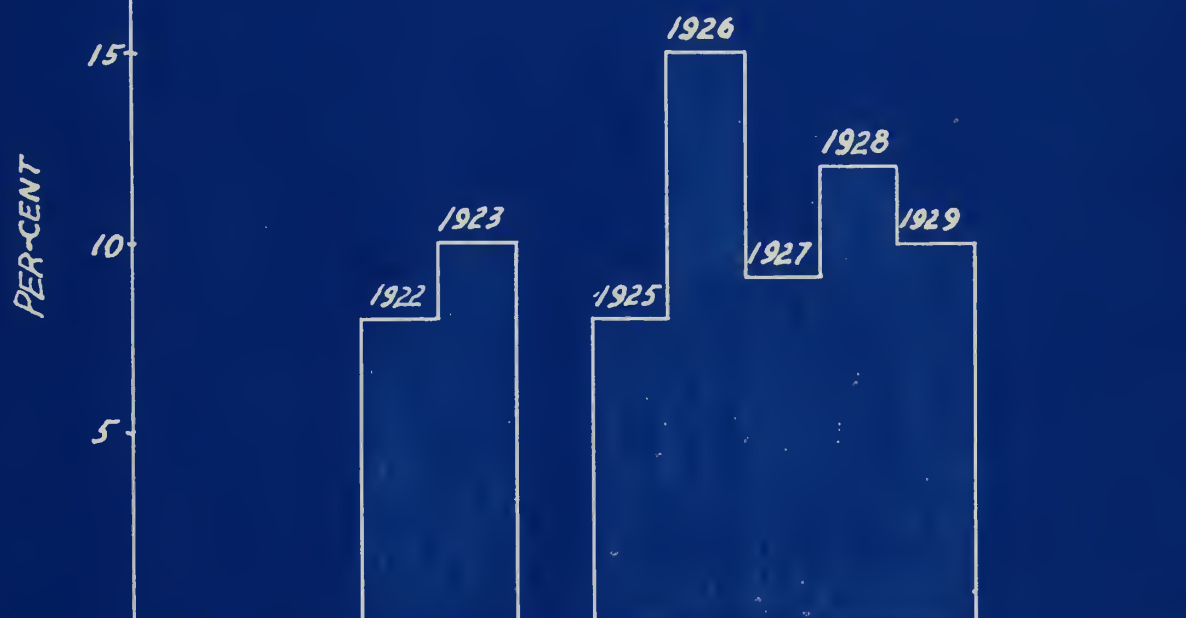
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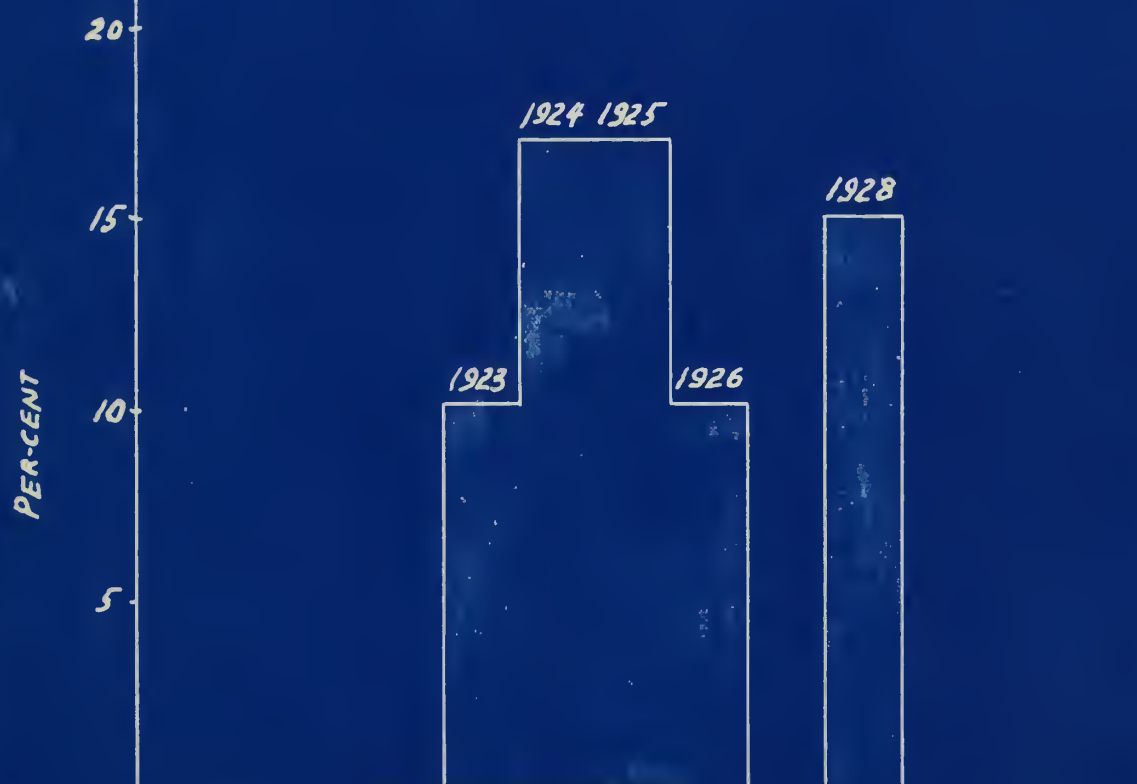
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DISTRIBUTION
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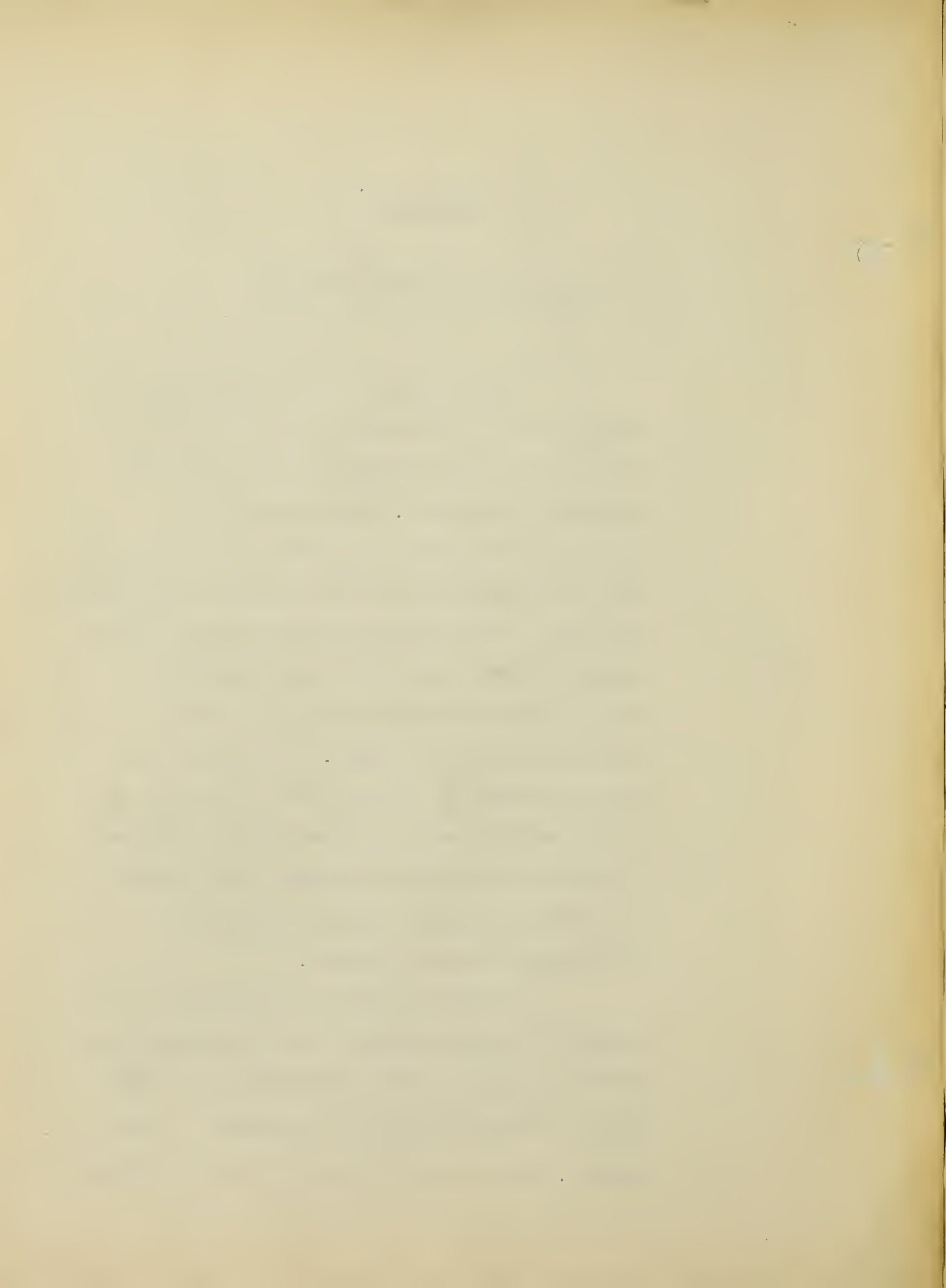


Chapter 6

THE EFFICACY OF THE PROGRAM

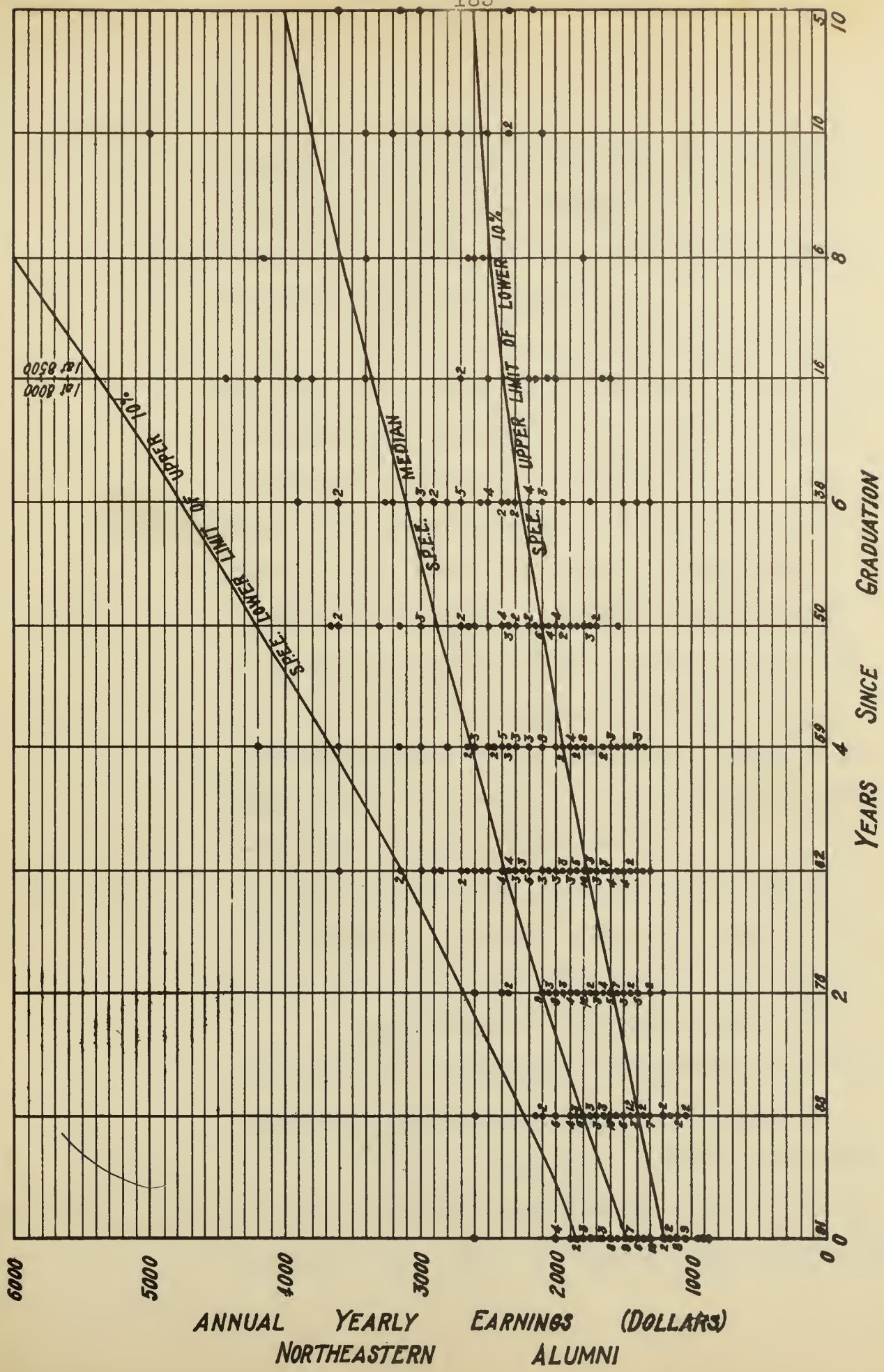
The efficacy of any educational institution is ultimately measured by the conduct and achievements of those who come under its influence. Regardless of buildings and endowment, aside from curricula, and notwithstanding the educational procedures employed, the empirical test provided by the actual accomplishments of its graduates constitutes the real criterion by which a university must be judged. Accordingly it is appropriate to inquire into the status of Northeastern alumni: to find out what degree of success they have attained in professional life and to evaluate their standing as college men and as citizens.

A recent survey of graduates of the School of Engineering for the purpose of discovering the range and distribution of their salaries affords certain information in this regard. This survey reported upon 458 alumni



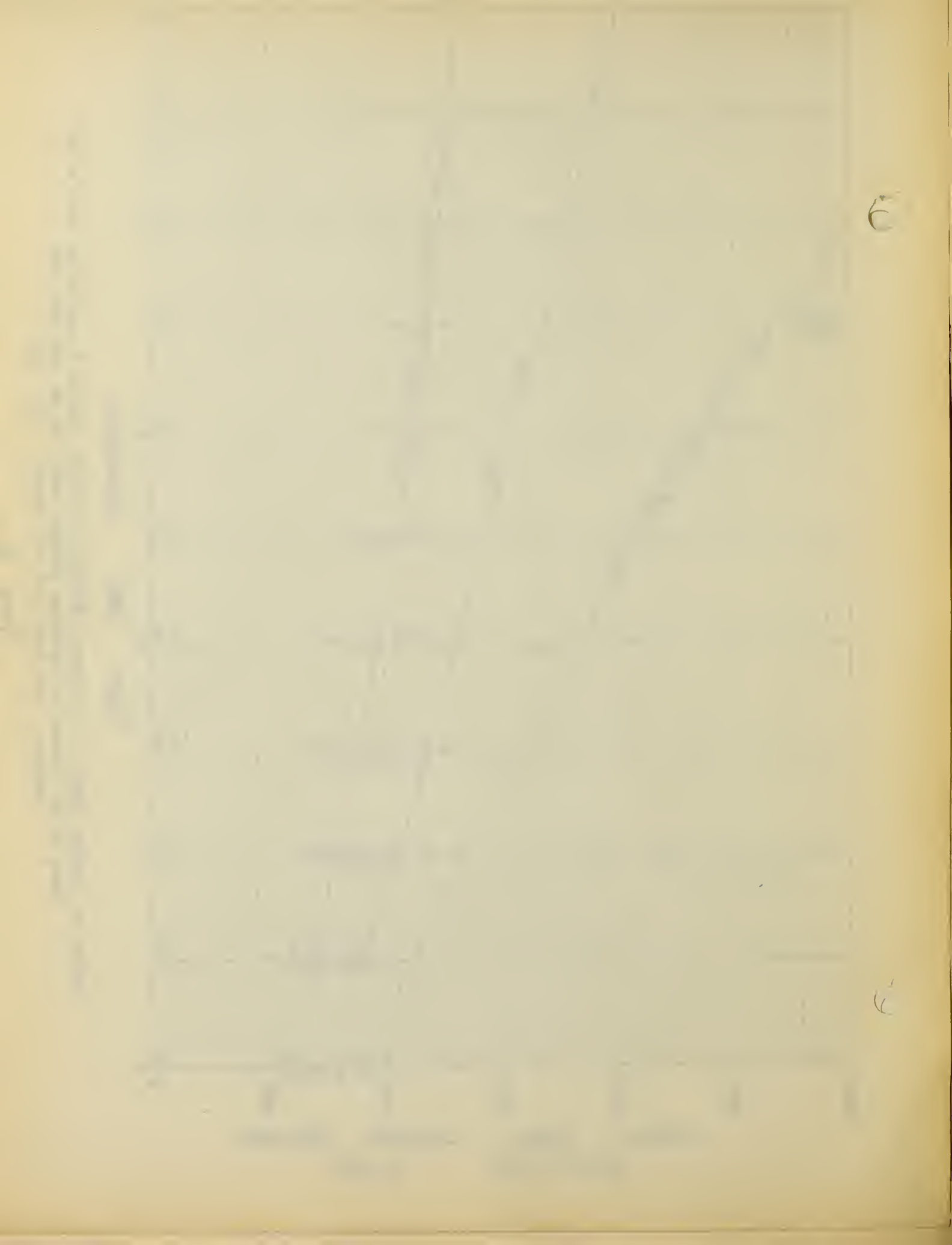
representing 48.7% of the total number of graduates. Since the data were obtained almost entirely from employing companies they were not susceptible to the criticism that more high salaries than low were reported. It, therefore, seemed that the survey was based upon an adequate sampling of the alumni body and that the results comprised a fair index of the earning capacities of Northeastern graduates. A graphical comparison of these salaries with those earned by the graduates of other standard engineering schools and reported by the Society for the Promotion of Engineering Education in 1935 is shown in Figure III.

But salary data alone is not an adequate indication of relative success in life. Satisfaction in one's work and happiness in one's social and civic responsibilities are not as easily measured but they nevertheless represent substantial elements of success. To what degree the Northeastern co-operative plan has contributed towards the achievements of its graduates in these intangible satisfac-



Earnings of Graduates, School of Engineering, Northeastern University, Compared to Superimposed Curves of the Society for the Promotion of Engineering Education, Volume XVI, Dec. 1925 Page 287
Northeastern Data Based upon 458 Replies July 1928

Figure III.



tions it is obviously impossible to determine. At the same time, indications that the plan has been a helpful factor in furthering these ends are not at all lacking.

A short time ago Dean Carl Stephens Ell wrote to alumni of the School of Engineering, inviting their comments on the value of their co-operative training as preparation for life. The response was immediate and extremely gratifying. Such testimony does not lend itself readily to statistical treatment and it would obviously be out of place to rehearse here the many statements received. However, a few typical quotations will serve to illustrate the opinions of the graduates themselves as to the advantages of their training:

Writes one: "I feel that I owe to Northeastern more than to any other single factor the success and happiness I now enjoy."

And another: "Financially and educationally, I consider my co-operative training one of the best investments I ever made."

Still a third says: "The associations of my co-operative undergraduate days at Northeastern account for the most intimate and lasting

friendships of my life. I value them beyond any other influence of my youth."

But to investigate more specifically the results of the guidance program at Northeastern the authors prepared a questionnaire which they administered personally to members of the senior class in the School of Engineering of Northeastern University. This questionnaire was aimed at determining the relative importance of various features of the guidance work according to student opinion, the values of co-operative training as they appear to those who are actually undergoing such training, and finally the vocational plans of the students after graduation. The questionnaires were distributed at class meetings, following a careful explanation of their scope and purpose. Plenty of time was allowed so that the forms might be filled out carefully and thoughtfully. The students seemed to undertake the task cheerfully and in a spirit of sincere co-operation. It is felt that the replies are on the whole a fair index of student opinion. As

has already been implied, this senior class is the same group of students (what is left of them) studied by Dean Ell as freshmen in 1927-1928. The charts, graphs, and correlations which follow therefore include data acquired in 1927-1928 as well as that obtained from the questionnaire developed by the authors. Care has been exercised in the endeavor to specify on each table or graph the precise nature of the material upon which it is based.

In addition it seemed desirable to obtain similar reactions on the guidance program from a group of alumni who had been for several years in engineering practice. Consequently a somewhat different and decidedly more comprehensive questionnaire was prepared and issued to the class of 1925 who are now completing their sixth year after graduation.

A number of charts showing the relationships existing between the basis of choice of engineering as a life career and various accomplishments in college are shown on the succeeding pages. The first of these shows the relation between basis of choice of engineering as a

life career and retention in college. The study is based upon the 150 members of the class of 1931, comprising the 50 highest ranking students, 50 middle ranking students, and the 50 lowest ranking students at the end of the first ten-week marking period of the freshman year. An examination of the table seems to indicate that those students influenced primarily by the definite appeal of engineering work have the greatest likelihood of remaining throughout the engineering curriculum. On the other hand, it is noticeable that of the 58 students influenced primarily by the advice of parents, only 11 completed the engineering program. It seems probable that many of these students were prodded into entering an engineering curriculum because of the desire of their parents that they should do so. It is not possible to draw conclusive results from a study of this sort because of the many contributing factors, but the inferences just drawn seem fairly warranted.

The next four tables show the relationship between high school standing and subsequent

scholastic achievement in the School of Engineering. The first table is based upon practically the entire senior class or a total of 159 students. As would be expected a large proportion of those students who were in the first quarter of their class in high school remain in the first quarter of their class in college. There are some exceptions, however, since it appears that 9 students who did exceedingly well in high school have dropped to the fourth quarter of their class in college. It is worth while noting that only 6 students who were in the third quarter of their high school class were able to survive the college curriculum and none of these students achieved the first quarter of his college class. Similar tables based upon the three key groups of students afore-mentioned are interesting to consider.

Of the 50 students who ranked highest at the end of the first ten-week marking period of the freshman year, 41 are members in good standing of the senior class, 5 have withdrawn and 4 are retarded. Slightly more than half of the original 50 still remain in the first quarter, the others being distributed between

the second and third quarters with none in the fourth quarter. Of the 50 middle students, 17 have withdrawn, 9 are retarded and the remaining 24 are pretty evenly distributed over the entire senior class. Of the 50 students who ranked lowest at the end of the first ten-week marking period of the freshman year only two have survived to be seniors, 44 of the remainder have withdrawn and 4 are retarded. These tables indicate that high school standing is a substantial index of probable success in the School of Engineering but that it is not wholly adequate since there are a number of students who did not do very well in high school who seem to have found themselves in college, and to have made good records there.

The next table indicates the relationship between scholastic ability and success on co-operative assignments. The scholastic standing is given as being in the first, second, third, or fourth quarter of the class. Co-operative work standing is represented by the grades A, signifying excellent; B, good, above

average; C, satisfactory, average achievement; D, mediocre achievement; F, unsatisfactory achievement; and FF, total failure. The co-operative work grades are a composite of the employer's rating, the opinion of the coordinator, and the grades received on co-operative work reports. It is worth noting that all but one of the A grades in co-operative work have been given to students in the first and second quarters of their class. Oddly enough the lone remaining A grade has been given to a student whose scholastic ability is very mediocre. On the whole it does seem that there is a definite positive correlation between standing in co-operative work and scholastic ability. The D students at co-operative work are largely in the lower levels of scholastic standing. This table is based upon 176 members of the senior class in the School of Engineering.

Another interesting table developed from the questionnaire distributed to the class of 1931 is that relative to the vocational plans of the seniors. Twenty-eight members of the class are planning to remain with their

co-operating companies; 134 are planning to get other engineering jobs; 32 are planning to continue their education in graduate and professional schools; and only 6 are planning to change their vocational objectives and to find work in non-engineering fields. Eight are undecided as to their final plans. The relatively small percentage of seniors, 13.5%, who are planning to remain with their co-operating companies is probably attributable to the current economic depression. In past years it has been found that from 35% to 55% have been absorbed by their co-operating companies. It is encouraging to find that 15% of the group are planning to continue their formal education and to discover that only 3% feel that they do not wish to continue in engineering work.

The opinions of seniors on the various values of co-operative training are shown in the next table. It is interesting to see that the monetary advantages of co-operative education are stressed by the greatest number of students. Notwithstanding the demonstrated

educational worth of the co-operative plan, the student persists in considering the concomitant financial advantages as of primary importance. Next in importance appears to be the value of the plan in helping students to acquire a sense of social understanding or job wisdom, and third in importance is the opportunity to acquire certain valuable technical skills.

The seniors were also asked to rate in importance the various factors which go to make up the program of guidance and co-ordination at Northeastern. The frequencies with which each activity appeared as first, second, third choice, and so on are shown in Table XXIX. Eighty members of the class felt that the Thesis work was of paramount importance. In this connection it should be realized that thesis work is usually undertaken at the plants of co-operating employers and thus provides a very definite link between theory and practice. Engineering conference classes received the next highest rank with special lectures and co-operative work reports, of nearly equal significance, in third place. Apparently the interviews with co-ordinators were considered by the

students to be of relatively little value in the guidance program. As a matter of fact these interviews probably brought very valuable, though intangible, results. Students naturally tend to discount the less obvious features of their training.

Similar questions were asked of members of the class of 1925 in order to compare the opinions of present seniors with those of men who had had an opportunity to mature somewhat in actual practice. Alumni opinion also stressed the importance of the opportunity to earn a substantial share of college expenses provided by the co-operative plan. Assistance in making adjustments to industrial environments, the chance to better understand and appreciate applications of engineering theory, and the opportunity to learn how to get along well with other employees were also considered of signal importance. About a third of the alumni felt that they had developed habits of study under the co-operative plan that had persisted since graduation. A striking feature of alumni

opinion on the relative values of various phases of the guidance program is the fact that the men were almost unanimous in electing the co-operative job itself as being of primary significance. Here again interviews with Co-ordinators of Co-operative Work were considered to be of minimum importance. It is worth noting, however, that these interviews probably served as a means of tying together the values received from all other factors in the guidance program. The interviews thus serve an important function in integrating the entire educational plan.

Relation Between Basis of Choice of Engineering as a Life
Career and Retention in College

| Basis of Choice | Order of Importance | | | | | | | | | | |
|----------------------------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | 11th |
| | IS | WD | IS | WD | IS | WD | IS | WD | IS | WD | IS |
| 1. Advice of Parents | 3 | 26 | 8 | 21 | 4 | 24 | 5 | 1 | 1 | 1 | |
| 2. Advice of Teachers | 2 | 7 | 1 | 5 | 6 | 5 | 1 | 3 | 1 | 2 | 1 |
| 3. Advice of Friends | 2 | 3 | 8 | 7 | 4 | 7 | 6 | 6 | 4 | 4 | 1 |
| 4. Lit. from N.U. | 2 | 2 | 4 | 8 | 2 | 6 | 4 | 9 | 4 | 2 | 1 |
| 5. Work done assn's formed | 5 | 3 | | 4 | | | 1 | | 2 | | |
| 6. Def.appeal eng.work | 36 | 20 | 15 | 7 | 6 | 3 | 1 | 3 | 2 | 3 | 2 |
| 7. Apt. for eng. | 2 | 3 | 13 | 7 | 8 | 2 | 8 | | 2 | 2 | 1 |
| 8. Earn good living | 4 | 5 | 5 | 11 | 14 | 11 | 6 | 3 | 7 | 5 | 2 |
| 9. Prep.for work | 6 | 1 | 4 | 11 | 4 | 6 | 1 | 5 | 1 | 2 | 4 |
| 10. Coop.plan | 5 | 13 | 9 | 6 | 9 | 13 | 8 | 7 | 3 | 3 | 2 |
| 11. Adver- tisements | | | | 1 | | | | 3 | | 1 | 1 |

IS - In school

WD - Withdrawn

TABLE XXI

RELATION BETWEEN HIGH SCHOOL MARKS
AND COLLEGE MARKS

(Based on entire senior class)

| High School Standing | Standing in Northeastern University | | | |
|-------------------------|-------------------------------------|----------------|----------------|----------------------|
| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter Total |
| 1st quarter | 28 | 20 | 7 | 9 64 |
| 2nd quarter | 15 | 19 | 32 | 23 89 |
| 3rd quarter | | 3 | 1 | 2 6 |
| 4th quarter | | | | |
| Total | 43 | 42 | 40 | 34 159 |

TABLE XXII

RELATION BETWEEN HIGH SCHOOL MARKS
AND RETENTION IN COLLEGE

(Based on 50 high students)

| High School Standing | Standing in Northeastern University | | | |
|-------------------------|-------------------------------------|----------------|----------------|---|
| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter With- drawn Total |
| 1st quarter | 23 | 7 | 1 | 4 35 |
| 2nd quarter | 3 | 4 | 3 | 1 11 |
| 3rd quarter | | | | |
| 4th quarter | | | | |
| Total | 26 | 11 | 4 | 5 46 |

TABLE XXIII

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 | 1495 | 1 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-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RELATION BETWEEN HIGH SCHOOL MARKS
AND RETENTION IN COLLEGE

(Based on 50 middle students)

| High School Standing | Standing in Northeastern University | | | | |
|-------------------------|-------------------------------------|----------------|----------------|----------------|----------------------|
| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter | With- drawn Total |
| 1st quarter | 2 | 1 | 4 | 2 | 9 18 |
| 2nd quarter | 2 | 5 | 3 | 4 | 6 20 |
| 3rd quarter | | | | 1 | 2 3 |
| 4th quarter | | | | | |
| Total | 4 | 6 | 7 | 7 | 17 41 |

TABLE XXIV

RELATION BETWEEN HIGH SCHOOL MARKS
AND RETENTION IN COLLEGE

(Based on 50 low students)

| High School Standing | Standing in Northeastern University | | | |
|-------------------------|-------------------------------------|----------------|----------------|-------------------------------------|
| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter With- drawn Total |
| 1st quarter | | | 1 | 1 |
| 2nd quarter | | 1 | 1 | 37 39 |
| 3rd quarter | | | | 6 6 |
| 4th quarter | | | | |
| Total | | 1 | 1 | 44 46 |

TABLE XXV

RELATION BETWEEN COLLEGE MARKS AND
SUCCESS IN CO-OPERATIVE WORK

(Based on entire senior class)

| Co-operative Work Standing | Scholastic Standing at Northeastern | | | |
|----------------------------------|-------------------------------------|----------------|----------------|----------------------|
| | 1st quarter | 2nd quarter | 3rd quarter | 4th quarter Total |
| A | 6 | 2 | | 1 9 |
| B | 16 | 10 | 9 | 5 40 |
| C | 18 | 25 | 26 | 21 90 |
| D | 3 | 7 | 9 | 17 36 |
| F | 1 | | | 1 |
| FF | | | | |
| Total | 44 | 44 | 44 | 44 176 |

TABLE XXVI

VOCATIONAL PLANS OF THE CLASS OF 1931
SCHOOL OF ENGINEERING

| Vocational Plans | Number of Students | Per Cent |
|------------------------------------|--------------------|----------|
| Continue with Co-operating Company | 28 | 13.5 |
| Other engineering job | 134 | 64.4 |
| Non-engineering job | 6 | 2.9 |
| Graduate study | 32 | 15.4 |
| Undecided | 8 | 3.8 |
| Total | | 100.0% |

TABLE XXVII

OPINIONS OF SENIORS ON THE VALUES
OF CO-OPERATIVE TRAINING

| Value of the Plan | Frequency |
|---|-----------|
| a. Helped me to find the types of work to which I am adapted. | 73 |
| b. Helped me to learn how to get along well with other employees. | 128 |
| c. Helped me to earn a substantial share of my college expenses. | 133 |
| d. Helped me to acquire certain valuable technical skills. | 102 |

TABLE XXVIII

OPINIONS OF SENIORS ON THE RELATIVE VALUES
OF VARIOUS PHASES OF THE GUIDANCE PROGRAM

| Guidance Activity | Frequency | | | | | |
|------------------------------------|-----------|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| a. Co-operative work reports. | 15 | 28 | 33 | 31 | 20 | 6 |
| b. Engineering Conference Classes. | 58 | 55 | 28 | 15 | 6 | 3 |
| c. Thesis | 80 | 35 | 22 | 15 | 6 | 2 |
| d. Interviews with co-ordinator | 3 | 9 | 22 | 22 | 22 | 16 |
| e. Special lectures | 17 | 38 | 40 | 24 | 17 | 5 |
| f. Visits to Industrial Plants | 4 | 8 | 12 | 12 | 17 | 17 |

TABLE XXIX

OPINIONS OF MEMBERS OF THE CLASS OF 1925
ON THE VALUES OF CO-OPERATIVE TRAINING

| Value of the Plan | Frequency |
|--|-----------|
| 1. Helped to find the types of work to which I am adapted. | 29 |
| 2. Helped to learn to adjust myself to industrial environments. | 42 |
| 3. Helped to learn how to get along well with other employees. | 40 |
| 4. Helped to earn a substantial share of my college expenses. | 56 |
| 5. Helped to acquire certain valuable technical skills. | 33 |
| 6. Helped to develop habits of study that have persisted since graduation. | 22 |
| 7. Helped to obtain a fairly good conception of what jobs college men hold. | 30 |
| 8. Helped to better understand and appreciate the application of engineering theory. | 43 |
| 9. Helped to observe and appreciate the economic aspects of engineering. | 23 |

TABLE XXX

OPINIONS OF MEMBERS OF THE CLASS OF 1925
ON THE RELATIVE VALUES OF VARIOUS PHASES
OF THE GUIDANCE PROGRAM

| Guidance Activity | Frequency | | | | | |
|---|-----------|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| a. Co-operative work reports. | 5 | 14 | 6 | 8 | 9 | 10 |
| b. Interviews with members of Co-operative Work Department. | 0 | 6 | 7 | 6 | 8 | 18 |
| c. Engineering Conference Classes. | 3 | 9 | 14 | 19 | 6 | 2 |
| d. Special lectures | 6 | 13 | 18 | 7 | 12 | 4 |
| e. Thesis | 3 | 18 | 12 | 9 | 7 | 6 |
| f. Co-operative job. | 54 | 5 | 2 | 1 | 3 | 1 |

TABLE XXXI

Chapter 7

GENERAL SUMMARY AND CONCLUSIONS

In this study we have tried to analyze and evaluate some of the more important aspects of the guidance program in the Day Division of Northeastern University. The thesis comprises a detailed description of the guidance procedures operative in the Schools of Engineering and Business Administration together with an investigation of the results of the system. In appraising the effectiveness of various phases of the guidance program consideration has been given to student and alumni opinion and employers' viewpoints, as well as to the factual evidence obtained from occupational surveys of co-operative students and graduates. On the whole it seems fair to say that the plan is functioning with substantial effectiveness and that it serves with reasonable adequacy the purpose for which it is designed.

Among the interesting and signi-

ficant results of the study are the following:

1. The student who comes to Northeastern primarily because of the definite appeal made to him by engineering activities is more likely to succeed than one who comes actuated by any of the other reasons listed in the freshman questionnaire.

2. Achievement in high school is a fairly reliable index of probable success in college. Taken alone, however, it is not adequate as a prognostic device since some students do well in college whose high school records are inferior and vice versa.

3. The student who ranks below the 50 percentile of his high school class has very meagre chances of being able to handle the work at Northeastern. There were nine such students in the key group of 150 who were studied. Only one of these survived and he was in the lowest quarter of the senior class.

4. In general there is a high positive correlation between scholastic

ability and attitude for co-operative work. Here again exceptions occur, but they are infrequent and usually attributable to some extenuating circumstances.

5. It appears that the seniors have quite definitely decided upon their vocational plans, less than four percent being undecided, and less than three percent being desirous of locating in a non-engineering field. One of the **biggest** advantages of co-operative training appears to be that it enables young men to discover early in their careers whether or not they are adapted to the profession for which they have undertaken to prepare. Furthermore, the period of transition from college to work is practically done away with for the student is ready for industrial responsibilities immediately after graduation.

6. Alumni opinion seems to be almost unanimous in establishing the co-operative job itself as of primary importance as a factor in the guidance program. In other words the jobs themselves are of such a

nature as to provide a wholesome training in the actualities of engineering and business.

7. The types of experience available to undergraduates on the co-operative plan appear to be sufficiently varied in character and extensive in scope; furthermore it seems that practically every student acquires those fundamental experiences that are particularly essential to his chosen profession.

It is felt that the data compiled with reference to the occupational distribution of students and graduates will be of real value in future counseling activities of the Department of Co-operative Work.

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APPENDIX

Questionnaires Used

_____Others—Please name them:

THE NEW YORK PUBLIC LIBRARY

ASTEN LENOX TILDEN FOUNDATION

1009 FIFTH AVENUE, NEW YORK, N. Y.

1900

THE NEW YORK PUBLIC LIBRARY, ASTEN LENOX TILDEN FOUNDATION, 1009 FIFTH AVENUE, NEW YORK, N. Y.

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(7) *Home Community*

Check the size of the community in which you spent most of your school life. If you have lived in different communities, indicate the number of years in each.

- _____ Rural, including villages up to 500 population.
 _____ Communities of 500 to 5,000 population.
 _____ Communities of 5,000 to 25,000 population.
 _____ Communities of 25,000 to 100,000 population.
 _____ Communities of more than 100,000 population.

(8) *Location of Your Home*

It is desired that you give the distance from school to your home over usually travelled route, in miles. A reasonably accurate figure is required. Do not simply put down a haphazard guess.

Distance from Northeastern to your home in miles over route usually travelled _____

Do you live at home? _____

If not, could you live at home? _____

Do you live with relatives? _____

Give the state (or foreign country) of your home _____

State total amount of time required each day for traveling to and from school _____

(9) *Kinds of Work before Entering Northeastern*

Indicate in front of the following items the approximate length of time in months which you have spent in each type of work:

- _____ Farming
 _____ Clerical or office work
 _____ Building construction
 _____ Mechanical
 _____ Salesman
 _____ Miscellaneous. List any others in which you spent considerable time.

(10) *Money Earned before Entering Northeastern*

How many months were you out of high school before entering Northeastern? _____

Did you work to earn money to come to Northeastern? _____

What were your total earnings before entrance? _____

How much money had you saved from your own earnings before admission? _____

(11) *Preparatory School*

Check the kind of school in which you prepared for college.

- | | |
|----------------------------------|---|
| _____ Public high school | Were you graduated? _____ |
| _____ Parochial school | What is the approximate total enrollment in |
| _____ Private preparatory school | the school you attended? _____ |
| _____ Others. Please list them. | |

(12) *High School Standing*

Check your scholastic standing in high school. Make as accurate an estimate as possible indicating whether you were in the—

- _____ Upper third of your class
 _____ Middle third of your class
 _____ Low third of your class

(13) *High School Scholarship and Preferences*

Indicate the studies in high school which you liked and those which you disliked.

Liked

Disliked

(14) *Interest in Student Activities in High School*

Number in the order of the extent of your participation, beginning with 1 as the activity in which you participated most. (Include all phases of the activity such as manager, editor, etc.)

- _____ Athletics
- _____ Musical Clubs
- _____ Dramatics
- _____ Student Publications
- _____ Others. Please list them.

(15) *Interest in Outside Activities While in High School*

Number in the order of the extent of your participation, beginning with 1 as the activity in which you participated most.

- _____ Boy Scouts
- _____ Fraternal Orders
- _____ Church activities
- _____ Musical clubs
- _____ Athletic clubs
- _____ Other activities or organizations. Please list them.

(16) *Basis of Choice of Engineering as a Life Career*

Check the important factors which influenced your choice of life career. Indicate only important factors and number in order of importance, beginning with 1 as the most important.

- _____ Advice of parents
- _____ Advice of teachers
- _____ Advice of friends and others
- _____ Literature received from Northeastern
- _____ Work done or associations formed therein
- _____ Definite appeal of engineering work
- _____ Supposed aptitude for engineering
- _____ To be enabled to earn a good living
- _____ Belief engineering course is good preparation for many lines of work
- _____ Because co-operative plan of education gives an opportunity to obtain a college education
- _____ Advertisements
- _____ Other reasons. Please list them.

(17) *Interest in Engineering*

- (a) What first aroused your interest in Engineering? _____

- (b) How old were you at the time? _____
- (c) When was decision to study Engineering made?
 _____ Before last year of high school
 _____ During last year of high school
 _____ After graduation from high school

(18) *Assistance from Northeastern in Choice of Life Career*

I. Interviews

1. How many personal interviews previous to registration did you have with members of the Northeastern University faculty or office staff? _____
2. Did the interview or interviews assist you in the choice of your life's career? _____
3. How did these interviews help you? (Indicate only important factors and number in order of importance, beginning with 1 as the most important.)
 _____ Gave me clearer idea of what engineering is
 _____ Opened an opportunity for me to gain technical training
 _____ Co-operative Plan showed me the opportunities in engineering
 _____ Aroused my interest in collegiate technical training
 _____ Showed me the need for college training
 _____ Indicated that I had the necessary qualifications for the engineering profession
 _____ State any other way the interviews helped _____

II. Literature

1. Did you receive any literature from Northeastern University? _____
2. Estimate number of pieces _____
3. Did any of these assist you in the choice of your life's work? (Not in the choice of a college) _____
4. State the title, closely approximate it, or describe the one or more pieces of Northeastern literature which helped you. _____

5. How did this printed matter help you? (Indicate only important factors and number in order of importance, beginning with 1 as the most important.)
 _____ Gave me clearer idea of what engineering is
 _____ Co-operative Plan opened an opportunity for me to gain technical training
 _____ Showed me the opportunities in engineering
 _____ Aroused my interest in collegiate technical training
 _____ Showed me the need for college training
 _____ Indicated that I had the necessary qualifications for the engineering profession
 _____ State any other way the literature helped _____

(19) *Choice of Curriculum or Special Field of Engineering*

Check the important factors which influenced your decision for choice of specialization. Indicate only important factors and number in order of importance, beginning with 1 as most important.

- ☐ Advice of parents
- ☐ Advice of teachers
- ☐ Advice of other friends
- ☐ Because of work done in this field by me
- ☐ Because of the appeal of this field
- ☐ Because of opportunity for advancement and success
- ☐ Because of reputation of the department
- ☐ No decided preference
- ☐ Because of physical reasons:
 - ☐ Health
 - ☐ Handicaps, etc.

(20) *Other Callings*

(a) What other callings for your life work did you seriously consider? List them:

| | |
|-------|-------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

(b) Would you now like to consider a re-choice of your life work? _____

(21) *Are Any of Your Relatives Engineers?*

Indicate by check.

- ☐ Grandfather
- ☐ Father
- ☐ Brother
- ☐ Brother-in-law
- ☐ Uncle
- ☐ Cousin

(22) *Vocational Guidance in Preparatory School*

Check any and all of the following ways in which you received Vocational Guidance before registering at Northeastern.

- ☐ Classes in Occupational information
- ☐ Vocational Guidance Counselor
- ☐ Group counseling by teachers
- ☐ Individual counseling by teachers
- ☐ Lectures by outside persons
- ☐ Practical experiences indicating ability
- ☐ Advice based on tests
- ☐ Industrial or field visits

(23) *Why Did You Choose to Come to Northeastern University?*

Check the important factors which influenced your decision to come to Northeastern. Indicate only important factors and number in order of importance, beginning with 1 as the most important.

- ☐ Advice of parents
☐ Advice of high school teacher or principal
☐ Friends now or formerly at Northeastern
☐ Athletics
☐ Other student activities at Northeastern
☐ The co-operative plan enabling me to earn while in college
☐ Desire for practical work
☐ Appeal of Northeastern as an Engineering School
☐ Literature received from Northeastern
☐ Northeastern advertisement in high school magazine
☐ Other factors or reasons. State them _____

(24) *Interest in Activities in Northeastern University*

Number in the order of your interest, beginning with 1 as the most important.

- ☐ Athletics
☐ Musical Clubs
☐ Dramatics
☐ Fraternities
☐ Student Publications
☐ Northeastern Student Union
☐ Others. Please list them.

(25) *Interest in Outside Activities While in Northeastern University*

Number in the order of the extent of your participation, beginning with 1 as the most important.

- ☐ Boy Scouts
☐ Fraternal orders
☐ Church activities
☐ Musical clubs
☐ Athletic clubs
☐ Other activities or organizations. Please list them.

(26) *Part-time Work While Attending Northeastern*

Set down number of hours you worked (exclusive of school work) per week and weekly earnings in appropriate place. If remuneration is in the nature of room rent, board, or transportation, indicate kind and amount.

| | | |
|----------------|-------------------------|------------------|
| Hours | Irregular or | Weekly Re- |
| Per Week _____ | Intermittent Work _____ | muneration _____ |
| Hours | Regular or | Weekly Re- |
| Per Week _____ | Steady Work _____ | muneration _____ |

(27) *Financial or Other Assistance from Home or Relatives*

Check proper items to indicate the assistance which you receive from home or relatives.

| | |
|---|---|
| <input type="checkbox"/> Board | Partial support. Indicate amount: |
| <input type="checkbox"/> Money for board | <input type="checkbox"/> More than three quarters |
| <input type="checkbox"/> Room | <input type="checkbox"/> Three quarters |
| <input type="checkbox"/> Money for room | <input type="checkbox"/> One half |
| <input type="checkbox"/> Clothing | <input type="checkbox"/> One quarter |
| <input type="checkbox"/> Textbooks and supplies | <input type="checkbox"/> Less than one quarter |
| <input type="checkbox"/> Tuition money | <input type="checkbox"/> Entirely dependent on myself for all |
| <input type="checkbox"/> Entire financial support | expenses |

[The text in this section is extremely faint and illegible. It appears to be a multi-paragraph document, possibly a letter or a report, with several lines of text visible across the page.]

NORTHEASTERN UNIVERSITY
SCHOOL OF ENGINEERING

Class of 1931

February 24, 1931

1. Name _____ Curriculum _____ Division _____
2. Please indicate, by checking the appropriate items, your after-graduation plans insofar as you now know them:
 - a. I expect to continue with my cooperating company ()
 - b. I plan to get an engineering job with some other company ()
 - c. I plan to get a job in some non-engineering field ()
If so, please state nature of the work you propose to do _____
 - d. I plan to continue my education by taking graduate work ()
If so, please state institution and field of proposed graduate study _____
 - e. I plan to do the following-not mentioned above _____

3. Please indicate, by checking the appropriate items, what values you feel you have derived from your cooperative training at Northeastern University:
 - a. The cooperative plan has helped me to find the types of work to which I am adapted ()
 - b. The cooperative plan has helped me to learn how to get along well with other employees ()
 - c. The cooperative plan has helped me to earn a substantial share of my college expenses ()
 - d. The cooperative plan has helped me to acquire certain valuable technical skills ()
 - e. Other ways in which the plan has helped me are: _____

4. What comment have you concerning the administration of the co-operative plan at Northeastern? What modifications would you suggest as being likely to improve its effectiveness? _____

5. What phases of the program of guidance and coordination have been of most help to you? Please number 1,2,3 etc. in order of their value to you.

| | |
|-------------------------------|------------------------------------|
| a. Coop. work reports () | b. Interviews with coordinator () |
| c. Eng.Conference Classes () | d. Special lectures () |
| e. Thesis () | f. Visits to Industrial Plants () |
| g. _____ () | h. _____ () |

Page 1 of 1

Class of 1961

Name: _____

Please indicate, by checking the appropriate item, what type of information you have derived from your cooperative training at _____ University:

- a. I derived information from _____ company
- b. I derived information from _____ other company
- c. I derived information from _____ other source
- d. I derived information from _____ other source

- a. I plan to continue my education by taking graduate work
- b. I plan to enter the workforce and field of proposed training
- c. I plan to enter the workforce and field of proposed training

Please indicate, by checking the appropriate item, what type of work you have derived from your cooperative training at _____ University:

- a. The cooperative plan has helped me to find the type of work I am interested in
- b. The cooperative plan has helped me to learn how to get along with other employees
- c. The cooperative plan has helped me to learn how to get along with other employees
- d. The cooperative plan has helped me to learn how to get along with other employees
- e. The cooperative plan has helped me to learn how to get along with other employees
- f. The cooperative plan has helped me to learn how to get along with other employees
- g. The cooperative plan has helped me to learn how to get along with other employees
- h. The cooperative plan has helped me to learn how to get along with other employees

What company, firm, or organization has been most helpful in your cooperative training at _____ University?

What phase of the program at _____ University has been most helpful to you in your future plans?

- a. General work reports
- b. General work reports
- c. General work reports
- d. General work reports
- e. General work reports
- f. General work reports
- g. General work reports
- h. General work reports

NORTHEASTERN UNIVERSITY
SCHOOL OF ENGINEERING

CLASS OF 1925-OCCUPATIONAL SURVEY

February
1931

Name _____ Degree _____

- I. (a) Did you remain immediately after graduation in the employ of the firm by which you were employed on the co-operative plan? Yes () No ()
- (b) If not, have you been employed there at any time since graduation? Yes () No ()
- (c) If you did stay, how long after graduation did you continue? _____ years _____ months
- (d) If still there, check here. ()

- II. Please indicate, by checking the appropriate items, what values you feel you have derived from your co-operative training at Northeastern University:

The co-operative plan helped me:

- | | | |
|--|---|---|
| 1. to find the types of work to which I am adapted | (|) |
| 2. to learn to adjust myself to industrial environments | (|) |
| 3. to learn how to get along well with other employees | (|) |
| 4. to earn a substantial share of my college expenses | (|) |
| 5. to acquire certain valuable technical skills | (|) |
| 6. to develop habits of study that have persisted since graduation | (|) |
| 7. to obtain a fairly good conception of what jobs college men hold | (|) |
| 8. to better understand and appreciate the application of engineering theory | (|) |
| 9. to observe and appreciate the economic aspects of engineering | (|) |
| 10. Other ways in which the plan helped me are: _____ | | |
| _____ | | |
| _____ | | |
| _____ | | |
| _____ | | |
| _____ | | |

- III. What phases of the program of guidance and co-ordination helped you most? Please number 1, 2, 3, etc. in order of their value to you.

- | | | |
|--|---|---|
| a. Cooperative work reports | (|) |
| b. Interviews with members of Co-op. Work Department | (|) |
| c. Engineering Conference Classes | (|) |
| d. Special lectures | (|) |
| e. Thesis | (|) |
| f. Co-operative job. | (|) |

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

WATER RESOURCES DIVISION

TO: DIRECTOR, BUREAU OF LAND MANAGEMENT
FROM: SAC, [illegible]
SUBJECT: [illegible]

RE: [illegible]

DATE: [illegible]

1. [illegible]

2. [illegible]

3. [illegible]

4. [illegible]

5. [illegible]

6. [illegible]

7. [illegible]

8. [illegible]

9. [illegible]

10. [illegible]

11. [illegible]

12. [illegible]

13. [illegible]

14. [illegible]

15. [illegible]

16. [illegible]

NORTHEASTERN UNIVERSITY
SCHOOL OF ENGINEERING

CLASS OF 1925-OCCUPATIONAL SURVEY

February
1931

Name _____ Degree _____

Please classify your present job according to the following table.
If your job can be classified under two or more sub-headings of a major classification, indicate the order of their importance by figures 1, 2, 3, etc.

I. Consulting Engineer ☐ Field ☐ OfficeII. Research ☐ Pure Science ☐ Development

III. Engineering

A. Design

- ☐ Drafting, detailing, computing
- ☐ Special Studies
- ☐ Supervision and direction

B. Application

- ☐ Reconnoitering
- ☐ Standardizing and Testing
- ☐ Engineering and construction
- ☐ Special studies
- ☐ Supervision and direction

IV. Commercial

- ☐ Sales ☐ Office and management
- ☐ Advertising and publicity

V. Manufacturing

- ☐ Operating and Service ☐ Testing
- ☐ Production Control ☐ Factory Planning
- ☐ Supervision

VI. Construction and Structural Engineering

- ☐ Design ☐ Engineering ☐ Inspection
- ☐ Office ☐ Supervision and Direction

VII. Patent ☐ Registration of Patents ☐ Supervision

VIII. Miscellaneous

- ☐ Teaching ☐ Business
- ☐ Others (please specify)

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY

WASHINGTON
D. C.

OFFICE OF THE CHIEF OF BUREAU

1911

REPORT OF THE CHIEF OF BUREAU
FOR THE YEAR 1911

IN COMPLETION OF THE
ANNUAL REPORT OF THE
BUREAU OF PLANT INDUSTRY

FOR THE YEAR 1911
BY
J. H. COOPER, CHIEF OF BUREAU

WASHINGTON
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BOSTON UNIVERSITY



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